



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

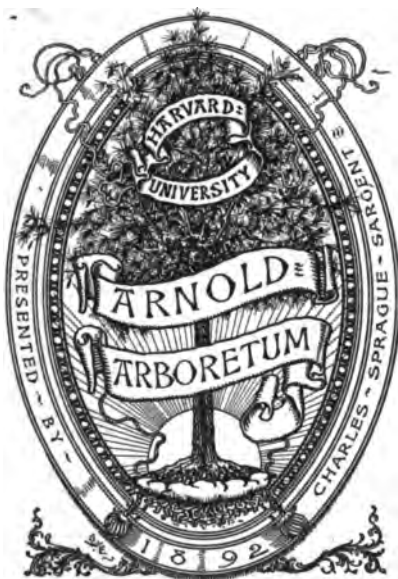
We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

JP

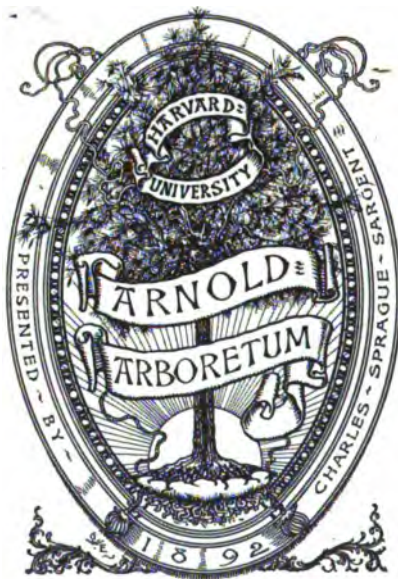


DEPOSITED AT THE
HARVARD FOREST
1941

BI

03.1

JP



DEPOSITED AT THE
HARVARD FOREST
1941

BI

03.1



THE
JOURNAL OF FORESTRY
AND ESTATES MANAGEMENT.

A MONTHLY ILLUSTRATED MAGAZINE DEVOTED TO THE SCIENCE
AND PRACTICE OF ARBORICULTURE AND THE GENERAL
MANAGEMENT OF ESTATES.

VOL. V.

MAY 1881 to APRIL 1882.

LONDON:

WILLIAM RIDER AND SON, 14, BARTHOLOMEW CLOSE, E.C.

1882.

58,103
Oct 13, 1971

LONDON:
WILLIAM RIDER AND SON, PRINTERS,
BARTHOLOMEW CLOSE, E.C.

INDEX.

	PAGE		PAGE
A Curiosity	143	Bird Cherry, The	129, 525
A Maine Tree	153	Black Walnut, The	143
A Suggestion	681	Blister on Larch, The	50, 125
Aberdeenshire Agricultural Associa- tion's Annual Report	290	Blown Down Timber	737
<i>Abies Carolinensis</i>	536	Blue Gum in Algeria, The	142
„ <i>Engelmanni Glauca</i>	223	Botanical Society of Edinburgh	121
Action respecting the laying out and planting of grounds at Guildford	733	Brabazon, Lord, and the National Health Society	288
Additions at Kew Gardens	47	British School of Forestry	30
Adie's Patent Lawn Edger	120	„ Timber Trade, Results of Recent Sales	58, 140
Age of the Mississippi Delta	832	„ Traces in Dean Forest	39
Agricultural Depression, and how to meet it, 73, 242, 330, 555, 655	655	Building Exhibition, Notes at the	54
Agricultural and Forest Meteorology	268	Buried in a Tree	831
Alder Trees in the West Highlands	202	Bute, The Island of, and Winter	286
Altyre Estate, Remarkable Trees on	249		
„ Wood Sale	760	Oan Sawdust be used instead of Straw for Bedding?	824
America, Forestry in	61	Capabilities of the Weymouth Pine	717
American Beech Trees	223	Cape Authorities and Forest Con- servancy, The	733
„ Bird Cherry	172	Cape of Good Hope and a Forest Com- missioner	286
„ Yellow Chestnut or Buckeye	435	Carlyle, Thomas, and a Memorial Oak	204
Amongst the Woods of Morayshire	305	„ on Tree Planting in Ireland	904
Ancient Forests of Hants, The	187	Carpeting Big Trees	455
<i>Andromeda floribunda</i> — Flowering Shrub, The	817	Caterpillars	443
Animals Eating Yew	754	Cattle Eating Yew, &c.	205
Annual Return of Prices of Timber, &c.	105	Cedars of Lebanon, The 433, 525, 685, 759	759
„ Table of Prices	29	<i>Cedrus Deodara</i>	60
„ Timber Sale at Darnaway	472	Chinchona Bark	759
Apples in Hedges	384	„ in Jamaica	753
Appointment of a Minister of Agriculture	121	„ in Southern India	732
„ of Sir Henry Brougham Lock, &c.	889	Collection and Ripening of Tree Seeds	349
Appointments	831	Common Alder, The	419
Arboricultural Excursion	196	Comparative Table of Prices realized per cub. ft. for Forest Produce dur- ing 1880	104
Ashdown Forest, and Earl de la Warr	122	Conifers at Fonthill Abbey	896
Australian Big Trees	870	Conifers—"Country Trees"	889
Australasian Colonies, Statistical Re- turns of	437	„ at Dropmore	303
Autumn Gales at Glenmoriston, The	740	„ on the Prairies	118
„ Tints on the Foliage of Trees	435	Continental Training for Indian Foresters	125
Autumnal Leaves	455	Copse-Wood in Hampshire	793
		Cost of Forest and Estate Piece-work	106
Balsam Poplar	210	Crown Forests, Sir John Lubbock on the	817
Barbed Wire Fence, The	455	Crystal Palace, Landscape Gardening at	24
Bath and West of England Society's Show	47, 223	Cuckoo, The	303
Beaconsfield, The late Earl of, as a Lover of Trees	16	Cultivation of Fruit Trees, The	433
Beauties of British Trees, The 699, 776, 854	854	Curious and Historic Trees	833
Beautiful Vines	759	Cutting and Seasoning of Timber, The 13, 9	13, 9
Beech and the Hornbeam, The	260		
„ <i>corylus</i> Hornbeam Hedges	897	Daily Changes in Trees	223
Big Tree, A	615	Damaged Larch Plantations	372

	PAGE		PAGE
Day among the Woods of Haddingtonshire, A . . .	580	Eucalyptus Planted in the Open Air . . .	123
Dean Forest, British Traces in . . .	39	Examination of Foresters in Edinburgh . . .	47
Death of Right Hon. W. P. Adam . . .	122	" of Students of Forestry . . .	205
" Sir Robert Christison, Bart. . .	734	Excessive Rainfall and its Effects . . .	435
" Mr. John Grigor, Forbes . . .	122, 212	Excrescences on Trees . . .	144
" the Hon. J. K. Howard . . .	730, 758	Exhibitors at the Royal Agricultural Show at Derby . . .	291
" Mr. Charles Lee . . .	434	Extent of Woods in Angus and Mearns . . .	224
" Mr. George Reid . . .	287	Extraordinary Abundant Crop of Haws on the Thorns . . .	607
" Mr. Toward . . .	122		
Decay of Underwood Stools . . .	52	Fatal Accident . . .	143
Destruction of Forests in Russia . . .	688	Fate of an Historic Tree, The . . .	874
" of the Pine Forest of Ravenna . . .	451	Favourable Season for Tree Planting . . .	684
Destruction of Trees in Storms, The . . .	759	" Winter for Operations of the Forester . . .	815
Development of Roots, The . . .	528, 599	Fern and Bracken Degenerating . . .	283
Dickson and Turnbull, Perth . . .	608	Ferns Propagated by Cutting . . .	302
Difficulties of Landowners, The . . .	46	Fine Tree Destroyed . . .	760
Discoloured Larch . . .	372	Fire at Warncliffe Wood . . .	142
Diseased Larch . . .	284, 326	" in the Woods at Bracknell . . .	143
Display of Flowers on Hardy Trees and Shrubs . . .	204	Fires in Plantations . . .	144
Does Forestry Pay? . . .	635	Force of a Lightning Flash . . .	304
Dogwood . . .	124	Forest Administration in India, Review of . . .	731
Douglas Spruce, The . . .	52	" and Chace of Malvern, The . . .	537, 617
Drainage of Land, On the . . .	578	" Conservancy and the Colony of South Australia . . .	731
Dry Weather and Forest Fires . . .	47	" Conservation in Australia . . .	613
Duke of Westminster's Estates in Cheshire . . .	48	" Culture . . .	228
Dysart, Earl of, and Cutting Timber . . .	205	" of Darnaway, and the Woods of Altyre and Brodie, The . . .	306
Earlsmill, The Old Ash Tree at . . .	435	" of Dean, The . . .	697, 761
Early Flowering Rhododendrons . . .	895	" of Dean Scenery . . .	123
" Planting in Scotland . . .	355	" Destruction in Australasia . . .	884
Edinburgh Arboretum and the Government . . .	522	" Fires in Canada, The Recent . . .	607
" Botanical Society, at the Meeting of . . .	815	" Fires in the United States . . .	425
" Duke of, and a Memorial Tree . . .	288	" Fires and How to Prevent Them . . .	821, 848
Education and Training of Foresters . . .	601	" Produce, Prices of and Cost of Work . . .	7, 79
Effect of the Decomposition of Prunings . . .	17, 90	" Service of India . . .	682
Effects of Frost in May . . .	283	" School for England, A . . .	732
" of Smoke on Trees . . .	760	" of Stone Trees, A . . .	832
" of the Gale in the New Forest . . .	598	FOREST WORK FOR THE MONTH:	
" of the Season on Spruce . . .	372	England—35, 107, 198, 280, 367, 427, 498, 593, 671, 726, 811, 885	
" of the Severe Frosts in the Midlands . . .	288	Ireland—37, 109, 200, 281, 369, 429, 500, 595, 673, 728, 813, 887	
" of the Severe Winter . . .	52, 130	Scotland—36, 108, 199, 281, 368, 429, 499, 594, 672, 727, 812, 886	
" of the Winter's Frost on Trees and Shrubs in the East of Berwickshire . . .	137	Wales—38, 109, 200, 282, 369, 430, 500, 674, 729, 814, 888	
" of the Winter Frosts on Vegetation in the Highlands . . .	144	Forests and Watercourses . . .	800
Elgin Nurseries, The . . .	411	" at the Cape of Good Hope, The . . .	788
Elm Blight, The . . .	615	" of the Sutlej Valley, The . . .	904
" The . . .	384	Forestry . . .	2
Employment of Dynamite in Removal of Decayed Timber . . .	48	" in America . . .	61
English and American Farmers . . .	131	" A British School of . . .	30
" Boulevards . . .	443	" in the United States . . .	77
Entomology, and its Study by Foresters . . .	730	Formation of Osier Beds . . .	807
Epping Forest and the Queen . . .	903	" of Vegetable Mould through the Action of Earthworms . . .	608
Errata . . .	223, 302	Forres Nurseries, The . . .	432, 523
Estate Workshop, An . . .	666	Fungi Raising Heavy Weights . . .	437
Eucalypts, Notes Regarding . . .	94	Fusion of the Branches of a Beech Tree . . .	279
		Fruits and Seeds . . .	23

	PAGE		PAGE
Gale of October 14th, The	519, 523, 609	Indian Forest Administration, Annual	
Gales of November 22nd and 26th, The	685	Review of	436
<i>Gardener's Chronicle</i> and Arboricul-		„ Forest Department, The	202, 206, 283, 438
turists	203	„ Foresters, Continental Training	
Giant Apple Tree, A	536	for	125
„ Elm, A	616	Influence of the Moon on the Rise and	
Good Dropper for Wire Fences, A	446	Fall of Sap	442
Gordon Castle	417	Inglis, Lord President, and the Shotts	
Grafting for Ornamental Effect	719	Iron Co.	289
Grease from Trees	536	Injurious Insects and Farm Crops, Lec-	
Great Gale of October 14th, 1881, The.		ture on	524
Its Effects on Trees and Plantations :		Injury to Larch Trees	130
England, Scotland, Ireland, and		Insects Attacking Scotch Fir	440, 528
Wales	502	Invercauld Estate, Braemar, &c. . . .	607
Growth of Coniferous Tree Stumps . . .	599	Ireland and its Facilities for Tree-grow-	
		ing	734
Happy New Year, A	682	„ Cultivation of Timber in	287
Hard Times	4	„ Tree Planting in	732
„ Winter and Insectivorous Birds . .	46	Irish Land Bill, The	87
Hardihood of Laurels	456	Ivy not Hurtful to Trees	453, 651
Hardwoods at Penrhyn Castle	408		
Hardy Catalpa in America	606	Kay, Mr. James, Forester	734
<i>Hantes and Basses Alpes</i> , Success of		Keillor, Mr. John, Forester	524
Efforts in the <i>Reboisement</i> of, &c. . .	819		
Havoc of Winter among Trees and		Landowner's Experiment, A	536
Shrubs, The	204	Landscape Gardening at the Crystal	
Hawthorns	681	Palace	24
Hazel, The	88	Larch and Douglas Pine in Perthshire	
Heath, Francis Geo., and the Thames	122	„ Natural and Transplanted	96
Hemlock Spruce, The	223	„ Trees on the Wilton Castle Es-	
Highway Act and Timber Merchants . .	46	tate	824
Historic Trees in America	759	Large <i>Araucaria Imbricata</i>	897
Historical Tree Destroyed in Greece . .	48	„ Elm Trees	456
Holly, The	561	„ Fire at Woolmer Forest, The . . .	303
Home Farm in May	24	„ Oak Tree, A	759
Home Farm in June	103	„ Walnut Trees	384
Home Farm in July	197	„ <i>Wellingtonia gigantea</i>	528
Home Farm in August	278	„ Willow, A	616
Home Farm in September	363	Largest Orchard in the World, The . .	614
Home Farm in October	423	„ Tree, The	614
Home Farm in November	496	Laurestine, Evergreen Shrub, The . .	817
Home Farm for December	592	Law of Entail, The	591
Home Farm in January	670	Lessons of the Harvest of 1881 . . .	450
Home Farm in February	724	Limestone Fossil	129
Home Farm in March	809	Lombardy Poplars	224, 384
Home Farm in April	873	„ „ Killed by Frost	759
Home Grown Timber	529	„ „ in Norfolk	832
„ „ „ in Scotland	122	London Sparrow, from a Transatlantic	
Horse Chestnut as a Shade Tree, The . .	599	Point of View, The	138
Hot, Dry, Weather and Insects and		Longleat Estate, Prices of Contract	
Plants	203	Work on the	99
Hough, Dr. Franklin, Address on "Our		Lord Wardenship of Epping Forest . .	141
Schools and Forests"	818		
„ „ and Schools of Forests 371, 523		Manchester, Planting Young Trees in	433
How to Destroy Field Mice	53, 210	Man Killed by the Fall of a Tree . .	903
Human Trees	104	Manual on Injurious Insects	48
<i>Hydrangea Hortensis</i> and <i>Fuchsia</i>		Manufacture of Charcoal at Penrhyn	
<i>Riccortonii</i> , The	654	Castle	473
		Measurement of Trees	614, 677, 825
Illinois, Report on the Crops, &c. . . .	436	Measuring a Growing Tree by the Eye	
Important Geographical Effects of the		„ the Height of Trees	825
Disforesting of Mountains, On the . .	447	Mechanical Sheaf Binders	379
India, The Forest Department, Code of	288	Mechi Fund, The	48
Indian and French Forest Students,		Melbourne Exhibition and New South	
Visit to the Highland Forests	431	Wales	437
„ Cedar, or Deodar, Tho	733	Men and Trees	302

	PAGE		PAGE
Meteorological Society, The	898	Photographs taken by Mr. Lawson, of	
" " " and the October		Forres	434
Gale	606	Piece-work	47
Miniature Trees	903	Pine Cone Embedded in the Trunk of	
Mountain Ash, The	455	a Pine Tree	144
Munsley Churchyard, The Yew Tree in	43	" Forest Area in Texas	816.
Mutilation of an Historical Tree	895	" Sawfly, The	263
Native Trees and Shrubs for Colour	616	Pines at Oatlands, Navan, Ireland	897
Natural and Transplanted Larch	96, 208	<i>Pinus Austriaca</i>	384, 495
New Forest, The	225, 536	" <i>Reflexa</i>	615.
" Hay or Straw Press, A	382	Plague of Insects, The	289
" Product from Birch Bark	141	Plane and Sycamore, The	131
" Species of Aphis affecting the		Plane Tree at South Kensington	
Pine	282	Museum	287, 371
" System of Draining, A	48	" " in Cheapside, The	669
" Vine, A	455	" " in Stationers' Hall Court.	205
Non-Flowering of Limes	384	Plantation at Glenlucie, on the Inver-	
Norway Spruce in Sutherlandshire	204	cauld Estate	203.
Notable Trees in Perthshire	303	Planting Railway Embankments	560
Notes at the Building Exhibition	54	Planting Unprofitable Land	640, 736
" Regarding Eucalypts	94	<i>Platanus Orientalis</i> , or the Oriental	
Nunupton Oak	722	Plane	434
Nursery Treatment of Plants 527, 596 676,		Plundering a Forest	435
735		Pollarding Scotch Fir	681, 737
Oak Apples on the Trunks of Oak Trees	303	Poplars for Ornament	383
" Bark Season, The	15	"Potentile," a New Blasting Compound	286
" Caterpillars, The	304	Power of Trees to withstand Gales	605
" Fern, The	536	Prehistoric Dialogue about Trees, A	383
ORTUARY: Right Hon. W. P. Adam	122	Presentation to a Forester	688
" Sir Robert Christison	734	" to Mr. W. H. Heale	142
" Mr. Rowland Ward Delves	302	Preservation of Scotch Fir Timber, The	26
" Mr. J. Grigor	122	Preserving Timber	194
" Hon. J. K. Howard	730, 758	Prevention of Dampness in Buildings	576
" Mr. Charles Lee	435	Price of Charcoal	681
" Mr. Alexander McRae	616	Prices of Contract Work on the Long-	
" Mr. Charles W. Ormiston	759	least Estate	99
" Mr. George Reid	287	" of Forest Produce and Cost of	
" Mr. Toward	122	Work	7, 79, 207
October	501	" of Oak Bark	46
Old Ash at Earlemill, Darnaway	441	Primroses under Fir Trees	142
" Irish Oak, An	454	Principles of Forest Organization, by	
" Oaks in Cadzow Forest	201	Professor Broilliard	819
" Scotch Schoolmaster on Sylviculture	110	Profitable Planting	702
" Yew Trees in Sussex	826	Protecting Trees from Rabbits 678, 738,	821
Oldest Tree in the World, The	144	Protection of River Banks, The	631
On Breeding Horses	142	Pruning	127
" the Gale of the 14th October, 1881	674	" Conifers	456
Open Weather and Tree Planting	524	Purple Nut, The	384
Ormerod, Miss, and Injurious Insects	435	Queensland Timber	45
Ormerod's (Miss) "Manual of Injurious		<i>Quercus Salicina</i>	143
Insects"	600	Quick Growth	832
Our New Volume	1	Railway Embankment Slopes and Trees	432
" Public Gardens	375	Rain Tree, The	144
Parasitical Plants	798	Raising Fallen Trees	526, 500
Partridge, The	343	" Large Trees blown down, &c.	607
Patent Tree Lifter, The	532	Rapid Growth of Trees, A	903
Pearson, Colonel, and the School of		Ravages of Insects in Parts of America	607
Forestry at Nancy 123, 371		Red-Twigged Lime	438
" " on the "Teaching of		Remarkable Discovery of a Bird's	
Forestry"	815	Nest, A	831
Petrified Forests	366	" Silver Fir	399
Pheasant, The, Its Origin, &c.	162	" Trees on Altyre Estate	249.
Philadelphia, The Horticultural Gar-		" Trees at Staunton Harold.	869
dens at, &c.	436	Remarkably Mild Winter, The	815
		Remedies for Agricultural Depression	789.

	PAGE		PAGE
Removal of Purple Beech	143, 304	St. Paul's Churchyard, The Garden in .	123
Report (Annual) of the Commissioners of Her Majesty's Woods and Forests	602	Sale of Wood	820
„ of Forest Department, Bombay .	121	Scaling, Mr., of Basford, Notts . . .	286
„ of Observations of Injurious Insects, by Miss Ormerod	818	Scotch Fir Timber, The Preservation of .	26
„ on a Visit to the English and Scotch Forests, &c., &c.	858	Scottish Arboricultural Society . . .	476
Resurrectioned Tree, A	614	„ Arboricultural Society Educa- tional Committee, &c.	524
Reviews—		„ Arboricultural Society : Excursion, the Forthcoming . . .	289
<i>Agricultural Gazette Almanack</i> . .	743	„ „ to Morayshire	370
Agriculture of Forfar and Kincar- dine, The	295	„ „ to East Lothian Woods	683
Arboriculture	132	„ Arboricultural Society, its Annual Meeting	431, 519, 683
Autumnal Leaves	742	„ Arboricultural Society's Prize Medal	554
Conifers of Japan, The	745	„ Pine, The	29
Die Europaischen Borkenkäfer . . .	745	Seats for the Public	455
Florist and Pomologist, The . . .	70,	Selection of Plants for general Planting, On the	337
136, 300, 377, 444, 614, 741,	827, 899	Selling Timber in Ireland	740
Foregone Conclusions : The Bees- borough Commission	135	Serious Blight of Caterpillars . . .	202
Foreign Exchanges—72, 136, 220, 300, 378, 444, 533, 608, 687,	749, 827, 900	“ Sheep Runs ” in England	707
Forest Songs	900	Sherwood Forest and Some of its More Notable Trees	385, 457
Formation of Vegetable Mould, &c. .	608	Silver Beech	614
Fruit-Farming for Profit	686	„ Fir, The	406
Indian Forester, The	299, 747, 899	Sleeping Tree, A	614
Journal of the Royal Agricultural Society	295, 743	Slide Rules	53, 128
Mannual of the Coniferae	213, 817	Society of Arts and Plant Labels . .	287
Manual of Injurious Insects	219, 600	Soluble Fir Tree Oil Insecticide . .	211
My Garden Wild	143	Source of Damage to Trees, A . . .	606
Pinetum, The	69	South African Forests	832
Rearing and Management of Hard- wood Plantations, The	70	Sowing Larch Seed	598
Siberia in Europe	132	Spontaneous Forests	615
South Australian Forestry	828	Spruce Fir Galls	285
Trade Catalogues	613	„ Gall Aphid, The	364, 721
„ Lists	535	Standard Fruit Gatherer, The . . .	612
Transactions of the Highland and Agricultural Society of Scotland .	296	Stealing Trees	224
Transactions of the Scottish Arbori- cultural Society	67	Successful Tree Transplanting . . .	688
Transactions and Proceedings of the Botanical Society	67	Suggested New Agricultural Re- source, A	752
Tree Culture in South Australia . .	299	Surface Draining	174, 250, 439, 491, 723
Untersuchungen aus dem forst- botanischen Institut zu Mün- chen	744	Sylviculture, An Old Scotch School- master on	110
Week's Holiday in the Forest of Dean, A	444	Teaching of Forestry, The	875, 903
Where to find Ferns	741	Technical Teaching	208
Wood Magic	376	Tenant's Evidence in the Irish Land Courts	903
<i>Rhododendron ponticum</i>	203	Theft of Young Trees	224
Royal Agricultural Show at Derby . .	288, 291	Thinning Plantations	49
„ Botanic Institution of Glasgow, Annual Report	819	„ and Pruning of Forest Trees, The	783
„ Horticultural Society and <i>Crypto- meria elegans</i>	205	Thousand-Headed Kale	50
„ Oak, The	454	Timber Culture in the United States .	739
„ Oak and Boecobel, The	802	„ Sale at Longleat	373
Sawdust for Bedding	896	„ Trees.—Cultivation and Con- version	750
Sadler, Mr. John, Edinburgh	607	Tithe Rent-charge	414
		To Protect Trees from [Rabbits] . .	129, 206, 265
		Tolley's (J. and W.) Guns	529
		Trade Catalogues	613
		„ Lists	535
		„ Tree, Dwellers in	615
		„ Guards	760

	PAGE		PAGE
Tree Planted by Queen Mary, A . . .	456	Virginian Creeper, Tho.	456.
„ Planting	615	Visit of French Forest Officers to the	
„ „ in Ireland	757	English and Scotch Forests	489
„ „ in Nebraska, 1880.	759	Voice from the Dead Urging the Or-	
„ „ in South Africa	688	ganization of a School of Forestry,	
„ Pruning . 400, 564, 527, 643,		&c.	353
710, 820			
„ Raising	737	What is to be done with Land? . 101,	
„ „ at Penrhyn Castle	680	192, 247	
„ Roots Choking Drains	831	Whirlwind at Bramham Park	373.
„ Struck by Lightning, A	303	White Beam, The	303
Trees and Rainfall	901	Why Ice Breaks Down Trees	142
„ and their Habitats, &c.	755	Why the Prairies are Treeless	142
„ at Warwick Castle	810	Windsor Forest and Great Park . . .	145
„ for Planting near Brick Kilns,		Winter Losses	17
600, 680		Wire-Worm	383
		Wistman's Wood	421
Use of Carbolic Acid in Forestry. 808, 897		Wooden Houses	536
Uses of Charcoal, The	716	Woodman Killed near Tuxford . . .	144
		Wood-Working Machinery for Estate	
Vagaries of the Fern Tribe and		Purposes	725
Poplars	374, 441	Wych Elms	210
Valuation and Measurement of Timber,			
5, 124		Yew Tree in Munsley Churchyard . .	43
Variegated Dogwood, The	455	Yews and Chestnuts	141



THE JOURNAL OF FORESTRY & ESTATE MANAGEMENT.

OUR NEW VOLUME.

WITH our present number is commenced the fifth volume of the *Journal of Forestry*, and according to our usual custom we open the new year with a few remarks as to our own doings, both past and future; apart from these, however, the slight alterations which it has been deemed advisable to make in the external appearance of the Magazine seem to call for a word or two of explanation. Four years ago, when this *Journal* was first introduced to the public, the study of arboriculture was confined within very small limits, and very few people beyond professional foresters and occasionally an enthusiastic tree-planter or land-owner took much interest in the subject. Far be it from us to glorify our own efforts or the good work which we believe this *Journal* has been quietly carrying on, but whether from this cause or from any other, true it is that public attention has, during the last two years, been aroused and interested in the subject of forestry in a most remarkable manner. On all sides, from the rugged highlands of Scotland to the grassy downs of Sussex, there is a growing inclination noticeable on the part of land-owners to plant trees both for ornament and for profit. The depressed state of agriculture is, doubtless, accountable in some measure for this change, and within the past few months cases have come within our knowledge where proprietors sooner than have unlet and unproductive farms remaining on their hands have decided to make plantations of oak and other hardwoods for the benefit of future generations.

It is, then, with a sense of the responsibility which this modern adoption of timber as a profitable crop thrusts on the only British periodical which gives instruction in this important branch of rural economy, that we commence our fifth volume, and it is with the view of meeting this increased demand for information that the slightly-changed appearance of the Magazine is made. Hitherto the *Journal of Forestry* has been a magazine written by foresters for foresters, but it is evident that our field must now be enlarged, and we consider that we should be wanting in our duty, both to foresters and forestry, if we did not embrace the present opportunity of popularising and

increasing the study of it by affording to landed proprietors, estate agents, and the public generally, such information as may enable them to carry out their arboricultural designs in a scientific and profitable manner. Our aim during the year will therefore be to render the study of forestry more attractive than it has hitherto been, and although it is our intention that the Magazine shall not be in any way less useful to the practical forester, we hope, by a judicious blending of the various topics of estate management with that of forestry *pur et simple* to gather around us such a number of readers from the large influential class of country gentlemen as will enable us to push the *Journal of Forestry* into the foremost ranks of rural literature.

We are pleased to state that the literary arrangements for our new volume are already well advanced, and the list of some articles already promised, which, through the courtesy of our esteemed contributors, we are able to print, is of itself a guarantee that Vol. V. will not be less interesting than its predecessors, while the efforts we are now making to obtain illustrated notices of some grandly-wooded estates throughout Britain, as well as contributions on various branches of estate management, will, we are confident, make the *Journal* a welcome monthly guest in many a country house where it is at present unknown.

We must not, however, allow our aspirations for the future to cause us altogether to forget the past, and the support which we have received in many quarters in our difficult task of establishing this *Journal* in the position which it now holds, and our best thanks are due and are hereby freely given to those gentlemen who have rendered us such valuable assistance both by their contributions and by bringing the *Journal* under the notice of their friends. In this latter way there is still much to be done, and if each one of our readers would consider it either a duty or a pleasure, or both, to send the publishers the name of at least one new subscriber we should soon be in a position to do still greater things for the advancement of the science of forestry than has yet been permitted to us.

FORESTRY.

AN occasional "dip" into the *Journal of Forestry*, during brief intervals of occupations which leave little time for the perusal of periodical literature, has convinced me that a publication, which in its present form must be, in an especial sense, interesting and valuable to a considerable number of persons, might have its sphere of usefulness largely extended by some alteration in its character. Such an alteration as I contemplate, in making this suggestion, whilst it would not detract in any way from the practical utility of the *Journal*, would,

I venture to think, greatly augment its popularity amongst a large and constantly-increasing class of persons.

In the present day, forests in this country serve two distinct purposes, both of which are useful, but useful in different ways. The one is strictly and severely utilitarian—using that word with its commonly-accepted meaning: the other purpose is to provide the means of recreation and study; to furnish the large and rapidly-augmenting populations of our great towns with health resorts, whilst providing the opportunity, for those who seek it, of following the delightful pursuits of natural history. Even so recently as during the period embraced by the first half of the present century, the disposition of those who were responsible for the conduct of public affairs was to cut down woods everywhere and to enclose and plough up the sites for agricultural, building, or other purposes. Large areas of open forest land were thus sacrificed, and the Enclosure and other Commissioners appointed by various Acts of Parliament entered with astonishing vigour, upon the, to them, apparently congenial work of destruction of our magnificent and primeval woods. But with the commencement of the second half of this century a marked change in public feeling with regard to our forests took place, and it began to be realised that unless some check were placed upon the process of demolition the consequences to the country would in every way be most serious, for the last remnants of our ancient forests would speedily disappear. One amongst the not very remote consequences of the enclosure and destruction of our forest lands would have been that there could have been no possible *raison d'être* for a “journal” of forestry.

Happily, however, some five-and-twenty years ago, public feeling against further reduction in the area of wild forests began to set in very strongly, and Parliament, moved by the public voice, stayed the hand of destruction. The result is, that though our ancient forests have been sadly shorn of their pristine sylvan splendour, we have, at least, left to us some beautiful remnants which are well worth preservation. The feeling, or sentiment, which has thus led to the conservation of our delightful woodlands has proved to be by no means ephemeral, but has, on the contrary, been growing in intensity for many years past. It is natural that the growth of towns and the separation of town populations from the enjoyments of country life should produce longings for a reversion to the delightfulness of sylvan scenes; and it is a fact that at no previous period have our woodlands been so dearly prized as they are at the present time. If proof be needed of this allegation it is abundantly provided by the existence of our numerous natural history societies, and by the immense development of the taste for natural history pursuits, including those of botany, entomology, and ornithology.

The idea of establishing a Journal of Forestry was undoubtedly a happy one ; and I should like to see it meeting the requirements of the day by catering more than it does at present for the necessities of the large public, who desire something more than instruction in the strict science of arboriculture. The title of "Forestry" is widely comprehensive, and under it might be included a mass of popular information on forestal botany, entomology, and ornithology. All that, so to speak, is outside the domain of a forest should be excluded, but, in that peculiar domain, there is a very wide field for the discussion of topics which, though they do not, perhaps, come strictly within the designation, have a more or less immediate relation to the subject. Forest history too, and the legendary lore of forestry, might also desirably be represented in such a publication as I should like the *Journal of Forestry* to become ; and I think the change I suggest might be effected without detracting from the more solid and practical value of the Journal as at present conducted.

FRANCIS GEORGE HEATH.

HARD TIMES.

THE ungenial nature of the past few years has told with unwonted severity on the farming community, and through them it is now being grievously felt by many families who have hitherto been able to live in affluence on the incomes derived from their estates. This source of revenue has failed to a serious degree, because in many instances tenants cannot be found to farm the land at any rent. From every part of the country, and especially from districts where clay lands prevail, we hear of farms going begging for lack of tenants which only a few years ago were considered among the most eligible and remunerative that a farmer could get possession of. Others have been let at a reduction on the former rents of from 50 to 100 per cent. This is a grievous loss to many families who derive their incomes from such property, and renders them unable to support the trade, as well as the charitable institutions in their neighbourhood, with their accustomed liberality. Hence the cry is from many villages and market towns that trade is declining and taxes increasing, and attributing the cause to everything but the real evil. It may not be in the power of man to materially alter or improve the climate ; but it should be the aim, as it is for the interest of every one, to introduce every rural improvement which can add to the productiveness of the land, and every facility for rearing and disposing of the crops that are found most profitable in our changeable climate. Rural prosperity and comfort will then return, and the present sore depression, after inculcating a useful lesson, will soon be forgotten.

THE VALUATION AND MEASUREMENT OF TIMBER.

I HAVE read with much pleasure the very interesting paper in your last number upon this subject, by Mr. A. J. Burrows, and as I have for many years viewed and valued large quantities of timber in most counties in England and Wales, and have had the management of many residential and agricultural estates, I should like to make a few remarks, and give the result of my experience on some of the points treated so ably by Mr. Burrows.

In valuing timber on a residential estate on the occasion of a sale, I have invariably valued the "ornamental trees" at their full commercial market value, and not, as Mr. Burrows states, at "half-price." As a rule, the largest, and generally the most valuable, timber on a residential estate is purely ornamental, and if that were excluded from the valuation, or only valued at half-price, the purchaser would obtain for nothing a very important element of value. Of course the mode of valuing entirely depends upon the conditions of sale, but during my practice I have never found the conditions exclude from valuation the ornamental timber; and as a matter of fact, if they did so exclude them, disputes would almost inevitably arise as to what were, or were not, ornamental trees. If, in the contract for sale and purchase of the estate, it was simply stated that the timber and timberlike trees were to be valued in the usual way, then by custom, all the trees, without distinction, would be valued, down to the value of 1s. per stick inclusive. It is well known that a tenant for life, "without impeachment of waste," may cut any timber on his estate except "ornamental timber, or that planted or left standing for ornament or shelter;" but in the exercise of this right I have known many disputes and much litigation arise.

Mr. Burrows gives the prices of timber at *per cube foot*, but timber sold off an estate to a timber merchant is invariably sold by "quarter girt" measurement, whether standing or felled. When converted by the timber merchant, it is sold by him either as "scantling" "squared timber," or by the "foot cube." Take, for instance, a tree with a length of 10 ft. and a diameter of 17 in.; the cubical content of this tree is 15 ft. 9 in., but the quarter girt measure is only 12 ft. 6 in.; therefore, if the price quoted is 2s. per cube foot, it is equal to rather more than 2s. 6d. per foot quarter girt measure.

There are four different modes of measurement of timber known and practised in the timber trade—"quarter girth," "true content," "die-square," and "squared" or "calliper measure."

Take a tree 20 ft. long and 24 in. diameter, the measurement by each of these modes will be as follows:—

"Die-squared" (17 in. square)	...	40 ft. cube.
"Quarter girth"	... ..	45 ft., rough measure.
"True content"	... ..	62 ft. cube.
"Squared" (calliper measure)	...	74 ft.

In classing oak or elm timber—those trees measuring 27 ft. and upwards are frequently put at a higher value per foot than those under 27, for the reason that at the Government dockyards no trees are taken under 40 ft. calliper measure, and 27 ft. quarter girth is equal to 40 ft. "squared," or calliper measure.

With regard to tellars, or saplings, I have always valued them according to their growth, and not according to their girth; some tellars at 5 in. quarter girth are only worth 1s., while others are worth 3s., 4s., and even 5s.

In estimating the value of timber upon any large area I think it hazardous to endeavour to arrive at an accurate or even an approximate valuation by measuring and valuing the trees upon small selected areas, *more particularly if the trees are of any size and different varieties*, and in such cases I have always measured and valued the trees separately.

In measuring standing timber I use leather straps and jointed bamboo poles (with a cane top) 20 ft. in length, and I have Timber Tables pasted in my note-book for reference in case of need.*

It may not be generally known that in valuing standing timber for sale, it is the custom in Kent only to measure *the spire* of the tree, and in many other counties the spire and *one* limb, so that the purchaser gets all the other limbs or branches thrown in.

With reference to the bark on oak trees, great difference of opinion exists as to the quantity obtainable from a load, or 50 ft. of timber quarter girth measure, and for the reason that so much depends upon the situation of the trees. In speaking of the average quantity of bark produced from a load of oak timber, no inference should be drawn *from any particular lot of timber, but from the average of the whole fall during the season*. In Surrey, Kent, and Sussex, for instance, small timber, grown singly in hedgerows, with short bodies and large heads, has been known to produce from 12 to 14 cwt. of bark per 50 ft., although this quantity is not often obtained; but, most probably, on the same estate, and in an adjoining coppice, trees standing close together, and well sheltered, would not produce more than about 7 cwt. of bark to the load of timber. Taking the three counties above named, I may assert with some degree of confidence that on the average six loads of timber will produce a load, or 45 cwt., of "hatched" bark, which is equal to 50 cwt. in the rough state, or very nearly 8½ cwt. per load of timber.

As to the proper allowance to be made for bark in measuring

* N.B.—I shall have much pleasure in sending a copy of my Timber Tables to any of your readers who may write me for one.

oak or elm timber, I do not quite agree with Mr. Burrows, for the reason that my practice has not been "to give half an inch under one foot girth and an inch for all beyond," but to allow *at the rate of one inch per foot throughout*, unless the trees are very rough, and then a greater allowance is necessary.

Much more might be written upon this important and interesting subject, but I have endeavoured to confine my remarks as far as possible to those points on which I differed from Mr. Burrows, although at the same time I consider his paper a most valuable aid to any young Forester or Land agent.

62, Old Broad Street, London,
28th March, 1881.

DANIEL WATNEY.

PRICES OF FOREST PRODUCE AND COST OF WORK.

WOOD differs from most other products of the soil in at least one important respect, namely, the situation in which it is produced. A tree, like a water spring, is valuable according as it can be turned to good account. It is not rare to find a tree growing in a situation where it requires its own value to remove it. I have seen more than one wood sale where the expense of preparing it was more than it realized.

Upon an extensive estate in the north of Scotland, where a large quantity of wood was sold annually, the foresters received their list of prices at which to sell the different descriptions of wood. The prices fixed upon were considered just and fair between all parties, and thus it was thought that all future transactions would be thereby greatly simplified. In theory the arrangement appeared to be good, but it was found to be impracticable, because of circumstances such as the following:—One lot of wood was close upon the side of a good road, while another was in a part where only half-loads could even with difficulty be taken out; another on level ground with an easy access to load, and otherwise to work with freedom and comfort; while near by it was a lot upon ground so broken on the surface, and intersected with drains and ditches, that double the labour was required, besides injury to horses, breakage of tackle, &c. Again, one lot of Scots pine was fine and well grown, and the trunks clean to a considerable height, straight and cylindrical in form; while against this stood another lot different in every respect—branches large in proportion to the size of the trees, and situated upon the trunks too near the ground. Now, if the cubical contents of any of those lots were taken and found equal, and the age and quality the same, and districts were situated alike, it would, to the theorist, appear that the prices should be nearly, if not quite identical, while to the practical man it would appear very different—so different

that the one lot would be cheaper to the purchaser at 8d. per foot than the other at 6d. or even 3d.

A further example of how prices are influenced by apparently trifling local circumstances occurred under my observation during the summer of 1870. A plantation forty years old was undergoing thinning, and amongst other kinds, a number of spruce trees were cut in the bottom of a ravine which extends through the centre of the plantation. The trees were all pruned of their branches on being cut, and cleared out of the plantation at the nearest convenient parts, while the branches were sold in the plantation to the neighbouring farmers and cottagers, allowing them to remove them as they best could. The plantation was a mixed one, composed chiefly of oak, ash, elm, Scots fir, larch, and spruce; and it was found, on comparing the cost with the sum realized, that they were just about equal. The wood of all sorts along the margin, and 50 yards in from the fence, paid at least 50 per cent. over and above the cost of labour, but that in the ravine cost in clearing it 50 per cent. more than its value. The hard woods in the ravine, after clearing, left a small margin in their favour, but the spruce was a dead loss.

A similar case occurred the same year while cutting for an auction sale. On one side of a deep ditch full of water a beech tree was cut worth 35s., and on the opposite side another equally good was felled, which gave only 10s.; and it was evident that the purchaser of the first had the best bargain, for in the one case good firm ground surrounded it, and a cart could get close to load it; while in the other, the ground was soft and boggy, hence the tree had to be cut into small sections, and dragged a long distance before it could be carted.

To these, other circumstances may be added, which contribute greatly to influence local prices of wood. Take the following examples:—In February, 1868, at an auction sale, where, as usual, the forester valued the wood previously, he found an English elm amongst the wood, which he valued at 20s., and from previous experience, that he knew to be its full worth in the district. At the sale, however, two or more boat-builders required such a tree for a special purpose, and so competed against each other till it finally reached £3 7s., or over 3s. per cubic foot. At the same sale some oaks reached 3s., and a few Wych elms also sold at fully 3s. per cubic foot.

In another district of Banffshire an auction sale took place in the autumn of 1869, about the beginning of harvest, at which time the farmers in the surrounding district were in quest of small wood for stack-yard purposes, of which the sale chiefly consisted. No other sale having been in the district for at least a year previous, a large number of farmers attended; and the supply being rather below than above the demand, a very spirited competition took place, and un-

precedently high prices were given ; many of the lots sold as high as 50 per cent. above the usual rate. Encouraged by the high prices referred to, a neighbouring proprietor made an auction sale of a similar description of wood in the month of May succeeding : and although the prices realized, especially towards the close of the sale, were considerably below those of the former sale, another was resolved upon in the same locality, which took place two months afterwards, and, as a natural result, the people within a limited circuit being all supplied, and some of them overstocked, only persons from a distance purchased the wood, at a sufficiently low price to allow for carting it the long distance ; and, indeed, but for the presence of one wood merchant, who bought when cheap enough to allow a profit after delivery at Newcastle, the sale probably would have come to a dead lock for want of purchasers, not to speak of low prices. It need scarcely be said that the proprietor was alone to blame for the results, who should have better known his market before cutting his wood.

Another example illustrative of the fluctuation of prices of wood occurred on the coast of Banffshire in 1863. Fish-curing being a considerable trade all along the coast, and the prospects of the season being bright both as to fish and prices, an extensive wood proprietor as usual cut and prepared a large sale in October, which was largely attended by purchasers ; and the competition was so keen that fully 20s. per ton was given for beech burnwood ; and inferior descriptions of wood, such as alder, willow, and poplar, realized from 12s. to 15s. per ton, being for all sorts about one-third above the usual selling price.

Hearing on one occasion of very high prices being given for larch timber upon an estate in Roxburghshire, and anxious to know the market from whence such prices were realized, I was disappointed to find that only the lower and clean part of the tree was charged for, and the upper part went with it for nothing. The object of this mode of selling was to sustain reputed high prices, and thus secure celebrity for the timber.

A proprietor in Inverness-shire, a few years ago, offered for sale an extensive and valuable lot of the best native Scots pine in Scotland, which was to be sold by cubic measure, and the offers to be at so much per foot. The wood was old, and a considerable number of the trees affected with rot, or *roy*, as it is termed in the Highlands, which circumstance either deterred many from offering at all, or induced them to make very low offers. An experienced wood merchant, amongst others, gave in his offer, which was 8d. per foot, being fully 1d. per foot above the next highest ; but his offer was given conditionally, that all sound wood was to be 8d. per foot, and that which was roy or heart-decayed to be 3d. per foot. It so proved, on cutting

the wood, that about as many trees were less or more affected with rot as there were sound ones. The issue of the transaction was, that the wood merchant had an excellent bargain, because every tree, however little affected, went at 3d. per foot, while to the wood merchant who manufactured it all, it was almost as valuable as one quite sound at 8d. per foot.

Another circumstance that affects the price of wood essentially its quality. This, in a general sense, is universally known, but special cases it is not. Elm, for example, is spoken of and known on as two distinct kinds, English and Wych, or Scotch, without other distinction in a commercial sense. That other and very important distinctions exist beside these will appear from the following circumstances :—I sold a considerable number of Wych elms in Banffshire at prices between 10d. and 2s. 6d. per cubic foot. The inferior quality at 10d. and superior at 2s. 6d. per cubic foot. The most important thing is that there is nothing in the external appearance of the tree nor even in the wood itself, until a tool is applied to it, to indicate which is worth 2s. 6d. and which worth only one-third of it. Wheelwrights are constantly in quest of red-wood elm (which they term the good quality), and which they use for naves of wheels, and willingly give half-a-crown per foot for it; but they always stipulate that the wood must be red, and not *yellowish*, otherwise it is refused.

Ash varies in quality as much as elm, but shows it in quite a different way; indeed, there is no tree that manifests its true quality outwardly so completely as the ash. Elasticity or toughness is one quality of ash, and this shows itself in the smooth glassy bark and cleanness from lichen or moss. It is this description that commands the highest price, and is used chiefly for tool handles.

Old ash is esteemed for furniture-making, and its quality for this consists, not in elasticity, but in shortness of the grain, which bears polishing; and a third point of quality consists in the general strength and durability of the wood, which is extensively used in wheel-making and which also commands high prices.

Sycamore as a tree commands both the highest and lowest price of any in the forest. In its young state it is comparatively worthless save for turnery purposes of small ware, and realizes about 10s. per ton for that purpose; but where large trees of suitable growth are met with, they command prices from 3s. 6d. to 5s. per cubic foot. In November, 1863, the trunk of a sycamore was sold at Newbattle, at an auction sale, at 5s. per cubic foot, which went to the south of England for musical-instrument making; and at Ochtertyre, in Perthshire about the year 1855, some sycamores were sold at similar prices which also went to England for a like purpose. At the present time all over Scotland, there is good demand for sycamore over 9 in

diameter for rollers for machinery, which realizes about 1s. 6d. to 2s. per foot.

Holly is a wood which is now much inquired after for pattern-making at print-works. Being exceedingly close and fine in the grain, it answers better than any other home-grown wood for this purpose. It realizes fully 3s. per cubic foot if clean and free of black knots. Its bark is very inflammable and suitable for torches, and from it bird-lime is made.

Wild cherry, or gean tree, is a wood increasing in demand and value of late years, especially for out-door purposes, as it stands exposure to alternate wet and dry better than all other hard-woods, not excepting the oak and Spanish chestnut. It has also many commendations for furniture-making, but cannot easily be glued, which is its chief objection for that purpose.

The common dogwood (*Cornus florida*), though not a tree, is an underwood plant of such importance as to merit attention. This, of all others, is the most valuable wood for the manufacture of gun-powder, and makes the finest description of it. It is sold by the bundle, which girths three feet round and five feet long, at 2s. 4d., or about 80s. per ton, in the green state, in the south of England; and from what is seen of it as a shrub in Scotland, it may justly be inferred that it would do equally well there.

Willows, as an article of forest produce, pay well, and might do so still more by planting wet parts, and even tops of turf dykes with them instead of with whins. The price of willows, according to kind and quality, varies from 9d. to 1s. 6d. per stone—the coarsest at the former figure, and the finest at the latter. Apart from marketing, there are many uses and purposes to which willow is applied upon an estate, such as binding up brushwood in the plantations, tying up plants in the nursery, and making baskets, which are useful in many ways.

The bark of trees is another article of forest produce still valuable and in good demand; but some sorts, as the oak, is not so dear as formerly, in consequence of chemical substances being used instead. Oak bark, taken from trees, including trunk and branches, chopped and bagged, is about £6 per ton for the best quality, and coppice bark about 10s. per ton more. Common oak tree bark costs in peeling about 30s. per ton—2s. for drying, &c., and 9s. for chopping and bagging. Larch bark being used chiefly in tanning sheep's skins, for which no chemical substitute has yet been found, the demand steadily increases. The general market price of larch bark at the present time is £3 15s. per ton, chopped, bagged, and ready for market, and costs as follows:—Peeling, 20s. per ton; chopping and bagging, 7s.; and drying, carting, &c., 3s. Birch bark is usually sold at about the same price as larch, but it is generally found that it scarcely pays the expense,

and is therefore almost quite abandoned. Alder, ash, and willow have severally been peeled; but now almost entirely given up. On oak and larch are now peeled, and they in many cases scarcely paid unless the work is done by contract, which it is almost invariably the best thing to do. The trees may be marked and cut off the root by the ordinary woodman, but pruned and peeled by the contractor.

The evergreen oak (*Quercus Ilex*) is at the present time more thought of for furniture than any other wood of home growth. Little of the evergreen oak is sold as timber, in consequence of its scarcity, as it is chiefly grown as an ornamental tree, and those who have them refuse, even at tempting prices, to cut them down. Probably as yet no market price has been fixed for the wood, but the writer has heard of 6s. per foot being offered for it. In furniture the wood is exquisitely beautiful, clear, and shining, as to lead to the conclusion that it is inlaid with rare and costly gems, or coloured glass in longitudinal layers.

The hornbeam (*Carpinus betulus*), though in general little thought of as a timber tree, has within the last few years risen greatly in fame. It makes beautiful furniture, such as table-tops, picture-frames, wardrobes, sideboards, &c. It is of a beautiful light colour, bears polishing well, and shows its beauty in the clearness and waviness of the wood, and the local cabinet-makers offer readily 5s. per foot for good, well-grained hornbeam.

The Scotch laburnum (*Cytisus laburnum alpinus*), is, like the former two kinds, more an ornamental than timber-producing tree. Its wood, however, is much esteemed for turnery-purposes, and highly prized for pulley-blocks, possessing, as it does, an inherent oiliness which enables the ropes, &c., to work freely, and prevents the axle of the shears from rusting. It is too small, generally, to sell by cubic measurement, but the prices usually paid are equal to about 3s. 6d. per cubic foot.

From the preceding examples it must appear plain that the quotation of prices for any given locality must either be accompanied with an exhaustive explanation, or entirely fail to convey the truth respecting them; but while the prices are shown to differ very widely from apparently unimportant causes, it may also very clearly be shown that in another, and very important sense, they are very nearly alike all over the country; and to the railway system may be attributed this assimilation.

Beginning at the far north, and proceeding southward, I shall explain some of the change-producing causes in the price of wood. The counties of Caithness and Sutherland may be considered devoid of trees, since they only grow to the height of protecting walls. Instead therefore of selling, the proprietors have to purchase all the wood

required for buildings, fuel, &c. Ross-shire abounds with excellent timber of all sorts, and disposes of a great part of it for local purposes, such as boat-building, fish-curing, general carpentry, and estate work, at the following prices, near a railway station or harbour: larch, best quality, from 1s. to 1s. 3d. per cubic foot; Scots pine, 8d. to 9d. per foot; spruce, 6d. to 8d.; oak, 1s. 3d. to 1s. 6d.; ash, 1s. 3d. to 1s. 9d.; beech, 8d. to 10d.; elm, 1s. 3d. to 2s.; the latter sums for suitable wood for boat-building. Beech burnwood, near the fishing villages, 8s. to 10s. per ton. Pit-props, which are sent to Newcastle, scarcely now pay expenses. The annexed prices were those realized about eight years ago. Common props, 2s. 6d.; crown ditto, 3s. 6d. per dozen—equal to 72 lineal feet

ROSS-SHIRE, in respect to wood, has not improved in any appreciable degree, from railroad, nor have the prices advanced in consequence, because most of the wood is locally consumed, and the surplus, including prop-wood, is sent to Newcastle and other places, by sea as cheap, if not cheaper, than by rail. The only advance in price is upon larch, for fencing purposes, which has, within the last few years, gone up about 20 per cent., and is thus accounted for: Larch of this description being in great demand all over Scotland, and nowhere more so than within a few miles of the lines of railway. It is conveyed thence at a cheap rate, and thus prices are obtained which in the chief market were formerly refused.

INVERNESS-SHIRE.—The prices of wood have in some districts of the county advanced very considerably since the opening of the Highland railway, and in others they have rather declined. In the town of Inverness, and along the district of the Caledonian Canal, prices have rather fallen, owing to the large supplies brought by rail, which formerly was done by more expensive and limited means. Before the opening of the Highland line of railway, Inverness was famed as a market for wood, especially natural pine timber; but now that it is supplied on either side by railway, which brings it from a long distance at a cheap rate of carriage, and being manufactured at less than half the former cost, it is sold at reduced rates. In Strathdearn, and along the Findhorn generally, similar results have been experienced as along the river Ness. Before the opening of the railway, Forres was also a wood market of no small importance, and a brisk trade in shipping wood was carried on, which drew the supplies from the upper districts, and afforded liberal prices; but since railway communication was opened through some of the best wooded districts in the north, these supply Forres at a rate cheaper than those districts can that are distant from the railway even a few miles. For example, Glenferness, a small but well-wooded estate, is distant from the Dunphail station on the Highland line about six miles; and the prices

realized there for wood are as follows:—Scotch pine, 6d. per cubic foot; larch, 10d.; oak, 1s.; birch, per ton, 5s.; larch fencing post 6 ft. long, $3\frac{1}{2}$ to $4\frac{1}{2}$ in. diameter at small end, 6d. each. The latter are in great *local demand*, hence the price is not influenced by distance from market, being all used in the surrounding neighbourhood. The estate of Dunphail surrounds the railway station of that name, and adjoins Glenferness, and the following are the prices realized for wood there, which, before the opening of the railway, were the same as those above quoted:—Scots pine, 7d. per cubic ft.; larch, 1s.; oak, 1s. 3d. birch, 8s. per ton; wire fence posts, 6d. each; and manufactured wood as follows:—Scots pine inch board, 9s. 6d. per 100 ft.; $\frac{3}{4}$ in. do., 8s. 6d. per do.; $\frac{1}{2}$ in. 7s. 6d.; scantling 5 in. by $2\frac{1}{2}$ in. per lineal foot, $\frac{3}{4}$ d.; do. 6 in. by 3 in. per do., $1\frac{1}{4}$ d. per lineal foot. The larch posts, it will be observed, are the same price at both places; but the other descriptions of wood differ considerably, owing chiefly to the extra expense in taking it into market; but before the opening of the railway, prices were a little higher at Glenferness than Dunphail owing to a supposed superiority of quality of wood.

While in some parts of Inverness and Moray prices have declined, in others they have considerably advanced. Up to the time of opening the Highland railway through Strathspey in 1863, the best quality of Scots pine timber realized only 6d. per cubic ft. while within a few months after its opening, and even in prospect of its being opened, the same class of timber rose $1\frac{1}{4}$ d. to 2d. per cubic foot, or about one-fourth its former price, and small thinnings scarcely saleable before, rose even higher in proportion than the timber. Taking all advantages into account, probably no part of Scotland benefited more by railway than the splendid strath of the Spey from Craigellachie to Laggan. So much is this the case, that wood is dearer in Strathspey than in any other part all over the North. This is caused partly by the facilities of transport, partly by the famed quality of the wood, and partly by the keen competition on the part of wood merchants, who, after establishing a trade, and having their machinery all at work, resolve to give the last possible farthing before allowing a lot of wood convenient to them to pass into other hands; and here I would remark, that the way in which the wood is offered for sale is such as to secure its utmost value. A lot worthy of a good purchaser is offered for sale by private contract, and sealed offers received up to a given date; and as there are always several offerers, the full value is secured; but should it in any case prove otherwise, the wood can stand over (not being cut till a satisfactory offer is obtained). Previous to the railway, the chief means of transport of Speyside timber was floating it in rafts down the river to Garmouth. This practice, though in some respects good and cheap, was not to

compare with the railway. The river often rose rapidly and unexpectedly high, and swept off all the wood along its banks, whether as rafts or loose wood, and carried it out into the German ocean. At other times, during dry weather, the river became so low that no floating could be done for several months, till rain or melted snow filled it; and under these circumstances no contract could well be entered upon, seeing the amount of uncertainty as to its fulfilment.

Darnaway, Brodie, and the district around Nairn have rather suffered than benefited in prices within the last ten or twelve years, which is probably in some measure due to the railway traffic, but there are other reasons that may be assigned for the decline of prices. The estate of Darnaway has been long and justly celebrated for its fine oak, larch, and other timber, and so long as ship-building was carried on extensively all along the coast, the wood was purchased at Darnaway, and used at every yard between Banff and Inverness, but within the last ten or twelve years the number of vessels built along the coast has been on the decline, and at the present time little ship-building is going on, therefore the demand for oak is less, and prices lower than formerly. Good oak, suitable for ship-building, eight or ten years ago, sold at Darnaway at 2s. 2d. per cubic foot, while the same description at the present time realizes only 1s. 6d. per foot.

The demand for larch timber is good, at prices varying from 10d. to 1s. 2d. per foot, and for medium size, larch for fencing, from 1d. to 2d. per lineal foot, according to size of wood. The latter description of larch is dearer now than it is known ever to have been. It will be observed that the distance to cart the wood is great, which accounts in some measure for the uniform low prices quoted.



THE OAK BARK SEASON.

THE lateness of the season has, on the whole, been in favour of the forester who has a heavy fall of oak, and bark-stripping on his hands. The length of the day, and the increased warmth of the sun, will render the process of stripping comparatively easy, and with a continuance of dry weather, bark should be saved in the very best condition, and good prices be obtained for the finest qualities. So far as we can hear, high prices are not likely to rule this season, and those who can hold on will probably realize a better figure when trade revives, and the demand in consequence becomes brisker. Growing oak for the bark alone is not a profitable investment in these times, and even the sale of the wood of coppice oak scarcely repays the outlay, especially in the coal districts of the country. It is apparent that the extensive oak coppices, which were once so profitable when the price of bark ruled so high, are now fast becoming hardly worthy to occupy

the land, and serious thoughts might be entertained of convert them into timber supplying forests, or devoting them, where suitable to agricultural purposes. We should be glad to have the subject discussed by those who have practical experience of the profitability, or otherwise, of oak coppices during the past ten years.



THE LATE EARL OF BEACONSFIELD AS A LOVER OF TREES.

WE are indebted to the courtesy of Mr. Francis George Hea the well-known author of "Our Woodland Trees," and other charming books on rural subjects, for permission to reproduce the following autograph letter, addressed to him but a short time before his death by the late Earl of Beaconsfield, and which, referring as it does to his lordship's love of trees, cannot fail to interest our readers.

We believe that this letter of the late Earl will come as a surprise to many people who may have failed to recognise, under the guise of the ambitious statesman and the busy politician, the quiet lover of trees and of sylvan scenery, and although the *penchant* of his illustrious rival, the present Prime Minister, for arboricultural matters has long been known and admired, it is pleasing to learn that trees also formed an object of deep interest to Lord Beaconsfield.

The Manor of Hughenden, to which Lord Beaconsfield was so much attached, is situated in an undulating part of the county of Bucks and the district has for many generations been noted for its richness in woodlands, and the attractiveness of its sylvan beauties. It is peculiarly the home of the umbrageous silvery beech; and the noble prominent features of the sturdy oak and towering elm are everywhere seen in the landscape. These and others have been taken full advantage of by the noble Earl in carrying out the landscape improvements on the estate. The most effective trees and shrubs have been distributed with skill and judgment in the grounds and park around the mansion, which occupies a commanding site, overlooking the valley of the Wye and a wide stretch beyond of finely-timbered country. Standing on a somewhat exposed position, the house is, however, perfectly sheltered by well-disposed plantations, which afford the desired protection without interfering with the splendid views of the beautifully wooded landscape from the windows of the principal rooms. Here then, amid those "green retreats" he loved so well, and which he had done so much to create, the distinguished statesman desired to rest in peaceful repose, after a long and honourable career spent in the service of his country, and which, in accordance with his sacred wish, has been wisely carried out, to the credit and honour of all concerned.



Dec 28 ^{Angbden} ^{Maust.} 80

Dear Sir,

I thank you for your
new volume - Your life
is occupied with two
subjects, which always
deeply interest me: the
condition of our Country,
& Dress

Having had some

F. G. Heath ^{Knowledge}
Y^{rs}

knowledge of the West.
of England 5 or 20 yrs
ago, I am persuaded
of the general accuracy
of your reports, both of
their previous, & their
present, condition.

You must remember,
however, that the condition
of the British Peasants
has, at all times, much
varied

varied in different parts
of the country. Those of
this district are well paid.
Their wages have risen
forty per cent. in my time,
& their habitation, are
wonderfully improved.

Again, the agricultural
population of the North
of England, the hinds
of Northumberland &
the

the contiguous counties,
were always in great
advance of the Southern
Peasantry, & with all our
improvements, continue
so.

With regard to your
being informed, that, in
many parts of the West
of England, the peasantry
are now starving, I
should



August 2nd
1862.

I should recommend
you to be very strict
in your investigations
before you adopt that
statement. Where is
this? And how, with
our present law, could
this occur?

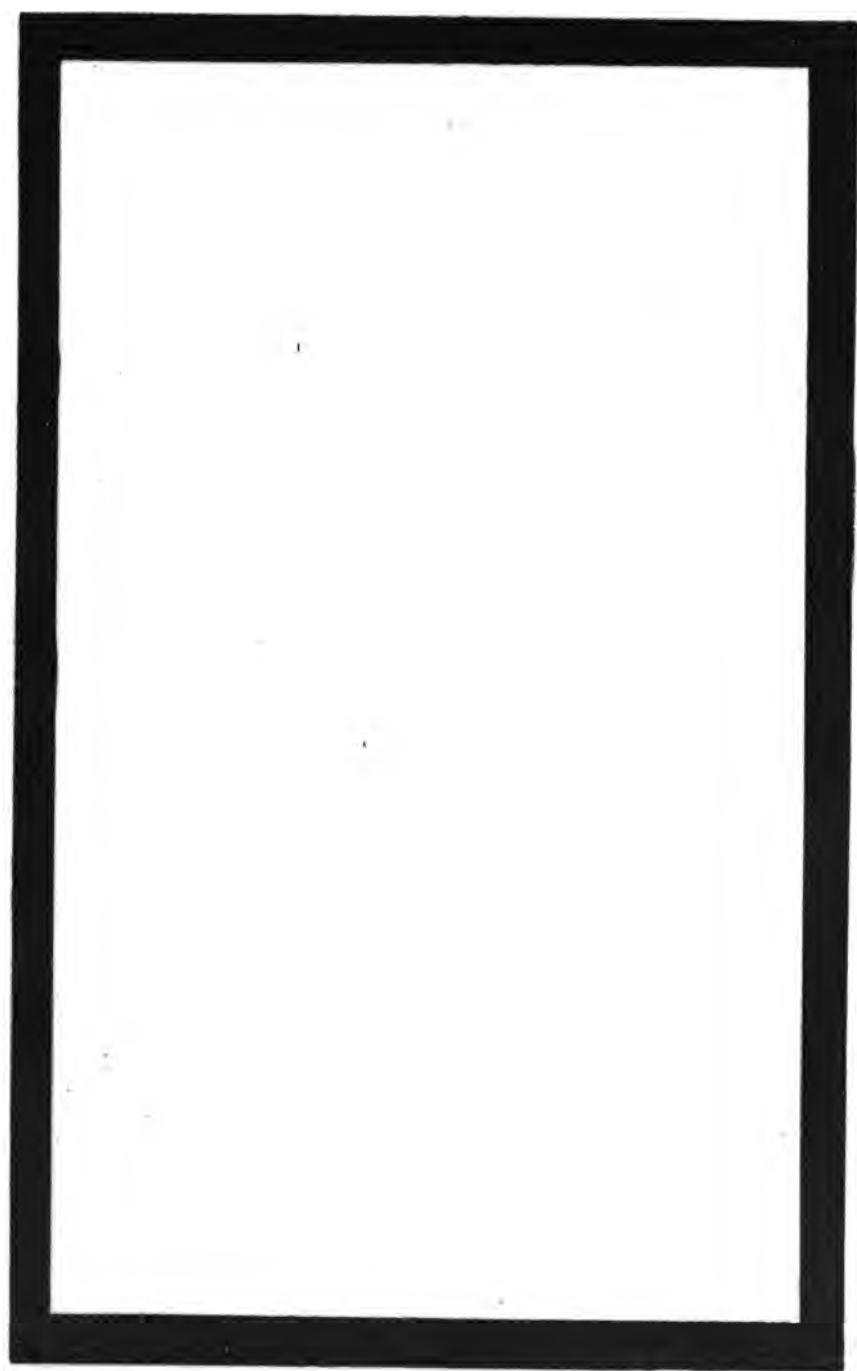
With regard to
Trees, I passed part
of

passed part of my
youth in the shade
of Burgham Beeches,
& have now the
happiness of living around
my own "green retreats".
I am not surprised,
that the ancients
worshipped Trees -
Lakes & Mountains,
however

However glorious for
time, in time weary-
Lybrian scenery never
falls.

for far

Heavenfield.



THE WINTER LOSSES.

THE severity of the past winter appears to have had a more fatal effect on vegetation than that of the two previous winters, although all three have been about equally rigorous. The duration of the last winter, however, has greatly exceeded the others, and perhaps in its length it has not been equalled in this century. To its unusual length must be attributed a considerable portion of the damage done to trees and shrubs ; because we hear from many parts that hosts of them have succumbed which were apparently uninjured till the middle of February, or when the severest part of the winter was over. Evergreens of every kind, even the most hardy of them, have suffered severely from the cold blasts of the early spring, and many of them present a brown, scorched-like aspect, which shows that they are grievously injured, and many of the tenderer kinds are killed outright. Rhododendrons are generally accounted among our hardiest shrubs, and from several districts reports reach us that they are badly injured, and many of the hybrid kinds are killed. The Portugal laurel, too, is reported to be worse injured than usual, and of course the common laurel is generally cut to the ground. Many deciduous trees and shrubs have had their young wood killed back more or less ; walnuts, poplars, chestnuts, willows, azaleas, guelder rose, catalpa, sumach, and like gross-wooded plants suffering most. When the list of killed and injured can be fully made up, it promises to exceed that of any previous winter on record.

*EFFECT OF THE DECOMPOSITION OF PRUNINGS.*

IN referring to what I said (p. 82, vol. iv.) about the benefits growing trees derive from their brush being scattered about, decaying, rather than having it collected and burnt, thereby incurring unnecessary expense, especially so if the trees are growing on dry, barren soils, Mr. Craig says (p. 718, vol. iv.), " But how about low-lying, damp, and rich ground ? Here they do more harm than good, if allowed to lie in any quantity, in preventing the action of sun, light, and air, from getting at the roots and the decaying matter to make it the proper food for the roots." I now go further, and say, that to trees of any sort, growing on low-lying, naturally damp, and rich ground, trees are benefited by their brush lying about decaying, though not to the same extent ; that is to say, providing the ground is always kept properly drained. I should like to ask if he, or anybody else, ever saw trees benefited by either sun or light getting at their roots. The case is quite different with air, heat, and moisture,

as, without their agencies, tree-food could never be prepared for the roots to take up, and we hold that the brush referred to only helps to excite those three to greater activity (see pp. 82—85).

Low-lying, shaded and naturally damp places no doubt encourage the growth of the fungi tribe, but I have yet to learn that ill-drained places are more encouraging to their growth than to that of trees. Mr. Craig has a spruce tree that has been killed of fungi, but he does not say that decaying tree rubbish was in any way the cause of this, and for all we know to the contrary, its death might be due to some other cause than this, although fungi was found growing on it. He says, "Let rubbish be burnt on the ground and their ashes spread about. They will then be in the best possible state for nourishing the trees and fixing ammonia in the ground." I cannot agree with him here. Soot is (to all gardeners at least) a well-known manure, its value being chiefly due to the ammonia it contains; and we all know that soot is formed from a *small part of the bulk* of the smoke of our fires, condensed by the cold coming in from without the chimney, and acting upon that part of it that comes in contact with the sides of the chimney in its upward flight. Mr. Craig would thus be putting a proprietor to the expense of converting into thin air, in large quantities, the very ammonia for which he is making, comparatively speaking, a small quantity of ashes to borrow back from the atmosphere, absorb, and fix, to be again washed out by rains, and carried down to nourish the tree roots. Mr. Craig evidently forgot when writing this that burning tree brush was just subjecting it to a very wasteful and rapid decay, rendering its inorganic substances less fit for plant food by being less soluble, and by suddenly banishing its ammonia upwards, which should gradually sink downwards, with the ash solubles, within reach of tree roots to feed upon. Burning also causes carbonic acid gas to form too quickly to be of much use as leaf-food, and likewise liberates hydrogen too rapidly and at too high a temperature to allow the moistening vapour it should form by combining with oxygen to be of any use in maintaining that damp atmosphere so useful for the growth of trees. I am pleased to find Mr. Craig so far confirming what I said about trees growing in sawdust. He goes on to say: "Look at low, damp, shady places, where there is much refuse lying, and you will find the under branches of trees die; even grass and other undergrowth will not live because of the bad gases, or, if you will, the want of pure light and air, and they even endanger the lives of large trees that grow amongst them." I would here remind Mr. Craig that bad gases, and air and light, are very different substances, and should never be confounded the one with the other. I could show him fine, healthy spruce with not only their lower branches dead, but grasses and heather dead under their shade also, and still they are fine,

thriving, healthy ; trees but then I want trees and not grass to grow there, just as a farmer wants wheat and not grass to grow in his field of wheat. Beginning with page 82, I showed the absurdity of the foetid gas theory, arising from decaying tree rubbish, and would suggest that Mr. Craig tries the following experiment with regard to this :—let him put any green, thriving plant he pleases in a place where it can enjoy plenty of everything except light, and he will find that both itself and branches must soon die, because it has no light to enable its green leaves to act their part in the growing economy of the plant. Trees always grow best in damp, showery, warm, sunny weather. Let him give his supposed experimental plant this sort of weather, artificially, and he will find how much it will hasten its decay. Let him give it again plenty of light, along with those other advantages (if it be not dead), and he will be surprised how soon it will revive.

I repeat it is said that decaying rubbish encourages the breeding of caterpillars and beetles, and he will find reference made to some who said so, beginning at p. 17 of the *Journal* ; and if Mr. Craig reads on from p. 213, he will find me showing that caterpillars breed in immense numbers on young fir trees, without the slightest aid from decaying brush of any kind. He will find (p. 501) Mr. Scott, and not I, saying “the ichneumon flies attack the caterpillar with ruthless ferocity,” and no doubt Mr. Scott will be able to answer any question Mr. Craig may put regarding this. Assuming that a few branches of the elder bush shall prevent the caterpillar, it would be interesting to know what he found the cost per acre of doing this to be.

It is certainly something to know that the caterpillars so spoiled the looks of one old fir wood. They do so to every tree they attack, but, with very rare exceptions, these trees will, in twelve months after, look very little the worse for having fed so many insects. In order to form some idea of the practical injury they are capable of doing, I told a friend of mine about the injuries done to a plantation of ours ten years ago, referred to in p. 213, and wished him to try and prove, from a cross section, and from the distance between their annual whorles of branches, that caterpillars were ever there, and he carefully tried, but failed. My friend Mr. Craig may remind me of having said that the growth of those trees was retarded during the two seasons affected by them, and so it was, though not more than ungenial seasons might have done. I again refer Messrs. Craig and Scott and others to what was said in your last May, June, and August issues, to show that not only is decomposing refuse of trees highly beneficial to growing trees, but that the injuries done to them by insects, if looked at from a £. s. d. point of view, are much more visionary than real, and that a proprietor could

scarcely fall into a greater delusion than that of spending his money (in this country at least) in stamping out injurious tree insects, as recommended by many ; and as my statements are so called in question, you will kindly allow me to make the following remarks, and in doing so I will adhere to the divisions under which I treated the subject, at p. 213. But before proceeding further, I wish to remind my readers of the great difference that exists between the crops of the arable farm, the garden, and the forest, although they are all of vegetable production—the one is intended for digestible nutriment of man ; but before being suitable for this, certain obscure plants known then only to the botanist, had, by the intelligent, persevering application of means to an end, to be raised from their wild and natural state to one so artificial as to render them very unlike their origin (an example of this we gave in the case of the wheat plant, vol. iii. p. 768, of the *Journal*) ; and having accomplished this great transformation, the former, for example, has to be always watchful to prevent his artificial wheat plant from following its naturally-inclined downwards tendency to something like its original wild and unproductive state ; by change of seed, and by maintaining a soil made highly productive by art from becoming too exhausted, to stimulate his wheat to its utmost productive powers. Again, the crops of the farm and garden are annual ; and let the profits to the proprietor and his tenant be what they may, after paying their labour, manure, and other bills, their average annual value per acre, for say a period of fifty years, may be as much as ten of that of the forest.

It is quite different with the produce of the forest. In place of it being either digestible or nutritious, and an annual, it is absolutely necessary it should be the very reverse, as it is intended for constructing purposes, and therefore cannot be too durable ; and experience teaches man that the best quality of timber is that which has been grown in its native, unaided wildness, and that in order to maintain a sufficient supply to meet increasing demands, it is always best to copy Nature, as far as modern changed circumstances will admit, in the growth of trees for profit. While man maintains his food-producing plants in such a high and we would say unnatural state of growth, so as to produce the best feeding results, it never surprises, however much it grieves him, to find winged and ground game endeavouring to share his fine crops with him ; or that they rapidly increase in numbers in consequence of the good feeding this affords them. Nor should it surprise him to find hosts of injurious insects seek their share of his crops also, and cause him sad and serious losses. Mr. Hutchison says (*Transactions of the Scottish Arboricultural Society*, vol. ix., p. 219) : “ We know that during recent years some species of insects in continental countries have marched

thousands of miles in a very few seasons, and have threatened the food of whole countries." We quite believe all this, and think it is entirely due to a higher state of the cultivation of land, and food plants. Not so with the forest crops, which we will now proceed in some measure to show, although Mr. Hutchison says, (Vol. i. p. 17 of the *Journal*), regarding insects and trees: "The havoc and devastation caused by insects is far more than that resulting from any other agency; and besides, when once these pests have established themselves in any locality, they are most difficult of dislodgment."

Let us now return to our subject again. At p. 213 we said, regarding insects:—

"1st. Those which principally feed on foliage; and we will take for our example *Lophyrus pini*, the pine saw-fly, or caterpillar." This insect, whose body is as soft and tender to the touch as the stalk of a delicate flower, is endowed with such marvellously-powerful digestive organs, as to cause it to be so ravenous as to be capable when full grown of devouring ten or twelve strong, healthy Scotch fir leaves per day; a description of food certainly not at all like what a casual observer would consider such an insect could enjoy. Their reproducing powers are so wonderful that one pair may in one season produce a family of twenty thousand millions. I recollect about thirty-five years ago of seeing in Scotland a thriving young fir plantation of about ten acres and five feet high, with perhaps about a million of them ravenously eating the tree foliage. If as to sexes they were equally divided, then on this spot of ground we found one half million pairs; and if each pair increased its species next season to the overwhelming number of twenty thousand millions, not only would all the pine foliage be eaten in a day or two, but they would so cover all Scotland that little could be seen of dry land except caterpillars. There are thirty-five seasons since then, and I have yet to learn that they are more numerous now throughout the country than they were. If we compare the habits and growths of Scotch firs now with what they were 250 years ago, judging from the remains of the ancient pine woods along the Dee, the Spey, and the Tay rivers, along with all we read about them, there is nothing to oppose the theory that these caterpillars are now more numerous than they were then, or perhaps a thousand years ago—and why? Is it because that man tried to destroy them by treating them to such remedies as carbolic acid hand-picking, &c.? My emphatic answer is, No. All this simply is due to Nature's mysterious adjustment of her own balances.

I said (p. 213), regarding the departure of our caterpillar visitors ten years ago, that where they came from or went to was to me a mystery; but this Mr. Scott finds to be no mystery, as he explains

the sudden disappearance (p. 581) by stating that they migrate involuntarily when the imago is wafted before the wind. We know here, to our cost, that inanimate snow is sometimes raised by the wind, contrary to the law of gravitation, and *wafted* along at a little elevation above the surface of the ground, until a somewhat sheltered hollow intersects the course of the wind, where the snow again obeys gravitation's laws and falls down. Pine saw-flies are quite different. They are things of life, and of great locomotive powers on the wing, capable of betaking themselves from one place to another, and these movements of theirs are guided by instinct (about which we seem to know so little) as well as by gravitation. One may therefore as well reason that a swarm of bees is wafted on a calm summer day, against their will, from the hive they have just quitted, to (let us suppose) some distant tree, as to reason that the pine-flies are wafted over thirty miles of country against their will.

I may here remark that we never saw or heard of the pine caterpillars attacking the same plantation twice. Will some of your numerous readers give their experience upon this?

2nd. Those which feed on dead or decaying trees. I will take as an example the case of *Hylobius abietis*, the fir weevil. I said I did not know that anybody found them do any harm to any plantations—say five years old—or to young trees about three feet high, their habitat being the tree-rubbish on the ground, where they can do no more harm than earthworms or other similar insects. In attempting to elucidate this important question, I looked at it from a standpoint of practical utility only, and therefore overlooked any injury done by those insects that could not well be expressed in £ s. d., or that did not stand out in the landscape as offensive to the eye of good taste, such as the destruction of foliage by caterpillars. Mr. Craig says he saw the branches of older trees than those I mentioned (p. 215) attacked by the weevil, and refers to the late Mr. Tivendale's statements on this subject (p. 631); but Mr. Tivendale found the *slight wounds they made* heal just as that from a grain of shot from a sportsman's gun would do; and, until Mr. Craig puts a money value on the injuries he speaks of, I hold his statements do not in the smallest degree mar those made by me. No doubt there is much to be said about this insect calculated to cause nervous people to feel seriously alarmed. Wherever these weevils have been met with, they were found in great numbers; which points to their reproductive powers, like those of the caterpillar or larch bug (p. 217), being very great. And the facts observed by practical men go to show that so voracious are they, that all the young fir-trees from 6 to 18 in. in height, planted in a new plantation succeeding an old one of firs, recently cut away, and of several acres in extent, may be totally

ruined by them in one season in consequence of the bark being peeled off all round at the surface of the ground; and although this is the only serious manner in which they have yet been found impeding the growth of trees, yet the fact that they have been puncturing through the young green bark of old trees suggests a possibility of them yet stripping off the young bark of fir at all ages, thereby making it an utter impossibility to grow trees, wherever they may be, thus showing the great necessity of having the weevil thoroughly stamped out; and one of the means to this desirable end now most popularly advocated is the burning up of all rubbish after each thinning, so as to completely rob them of their breeding and principal feeding ground of decaying tree-rubbish, and that at any cost, so as to starve them out.

Public attention was called to this insect by Mr. Baldwin, forester, Lennoxlove, Haddington, through the Highland Agricultural Society, in 1840, and I am not aware that any facts can be advanced to show that they did not exist and breed in great numbers among the accumulating tree-rubbish of our natural pine woods for hundreds of years; and yet, with all their mighty reproductive powers amongst large quantities of decomposing tree-rubbish, the injuries they do are yet so few that it is difficult to define them for trees above 3 ft. high or under five years old; and why? Simply because of Nature's marvellously great, though mysterious, powers of adjusting her balances among all living substances.

(To be continued.)

FRUITS AND SEEDS.

In the course of a recent lecture at the London Institution on the above subject, Sir John Lubbock, M.P., remarked that the seed of the Sycamore, the Maple, the Elm, the Birch, the Pine, the Fir and the Ash was attached to a leafy wing and carried to a considerable distance. In many cases the fruits and seeds were dispersed by animals. The animals were attracted to them by their brilliant colours, as in the case of the Cherry, the Peach, the Raspberry and the Strawberry. These coloured fruits formed a considerable part of the food of monkeys in the tropical regions of the earth, and we could not doubt that these animals were guided by their colours, just as we are guided in distinguishing ripe and unripe fruit.

The fact of the seeds being a temptation to such animals as mice and squirrels was not altogether a disadvantage, as the seeds were thereby often carried and buried in the ground, and they could very well afford to spare a few seeds for the squirrels and the mice. Some seed-vessels, such as the *Martynias* and some others, had very formidable hooks attached to them, which had been known even to kill a lion. These hooks adhered to the skins of animals, and the seeds were thus dispersed.

THE HOME FARM IN MAY.

ARABLE.—Well stir or plough the land intended either for roots or for forage crops ; also get on manure in dry weather. Hoe parsnips and carrots, wheat, peas, beans, potatoes, lucerne, mangolds, oats, and barley where no clovers are sown. Get in tares for Autumn use.

Mangolds, if not already planted, should be got in at once. For heavy crops select Sutton's Mammoth Long Red and Golden Tankard, or Webb's Champion Yellow Globe and Long Red.

Swedes may be drilled from the middle to the end of the month, either the Green-top, Purple-top, Laing's Liverpool Swede, Webb's Imperial, or Sutton's Champion. Force these into the rough leaf as early as possible, and well stir between the rows and hoe out early.

Hybrid Turnips, such as Dale's, Woolton's, and the white, red, and green Tankards, may be sown for early use.

Cabbage and Kale, for feeding off in early winter, should now be drilled. Those for Autumn use should already be in the seedbeds. The large Drumhead, Oxheart, Sheepfold, and Thousand-headed will be found useful varieties and great croppers.

Hops.—Finish poling, draw out rank bine and commence tying, shim to loosen the soil and keep down weeds, and apply a little stimulating manure to weak hills and patches.

Live Stock.—Mares in foal should be turned out or have green food in open yards. Colts should be turned out to grass by the middle of the month, and the working horses may have a proportion of rye, comfrey, or Italian rye-grass cut up with their dry food. Sheep may also be folded on the early grasses, on rye, or tares. Trifolium and rye-grass are sometimes mown this month. Fat sheep intended for early killing may be shorn.

Dairy.—Give cows an allowance of wurzel, comfrey, and cake, and turn them on the pastures by day.

Poultry will now want great attention, young ones having a good run with green food. Use dry food twice a day and wet between. Keep young turkeys dry.

Estate Work.—Remove timber and faggots from the falls, brush from the clearance roads, and deliver bark. Sow buckwheat for game.

A. J. B.

 LANDSCAPE GARDENING AT THE CRYSTAL PALACE.

AN interesting experiment is about to be tried by the directors of Crystal Palace Company at Sydenham, where they have decided

to institute a School of Horticulture and Landscape Gardening. The School is to be under the direction of Mr. Milner, the well-known landscape gardener, assisted by Mr. W. G. Head, Superintendent of the Crystal Palace. The course of study is to be divided into two branches, the first comprising Landscape Gardening, under the direct superintendence of Mr. Milner; and the second, consisting of Practical Gardening and Floriculture, in which department Mr. Head will act as chief instructor. The school is designed to afford students of the art of landscape gardening and horticulture an opportunity of entering their professions by a systematic mastery of details, acquired from practical instruction. It is also intended to present similar tuition to young gentlemen who are likely to be owners or managers of great estates, so as to be a means of enhancing the value, as well as the pleasure derived from the possession of land. For this laudable end the Crystal Palace and grounds around it present great facilities, of which it is intended to take every advantage. The curriculum for the course of Landscape Gardening, which extends over two years, is a comprehensive one, including the various branches of practical gardening, land surveying, drawing plans of estates from given dimensions, the designing and construction of buildings, roads, bridges, earthworks, and lakes, the selection of plants and formation of plantations, with instructions in forestry and woodcraft, &c. Lectures on the different branches will be given throughout the course to illustrate and explain the work that is practically carried on. At the close of the two years, the students will be examined in the proficiency which they have attained in the principal departments of their profession, and may gain a certificate of competency if they have displayed a reasonable amount of knowledge. The fee charged for the two years' course is £110; but it is optional on the part of the student to take either the first or second year's course for the sum of £60 for the one year.

The Practical Gardening and Floriculture Division of the School is designed for the training of young men for the profession of Gardeners and Nurserymen. The course is of one year; but students may remain, under the same conditions, for three years if they choose. The instruction comprises all branches of Gardening as carried on at the Crystal Palace; with lectures and demonstrations on the practical operations, or on special subjects connected with Horticulture. The fee for a student in this division is £30 a year; but he receives a small wage—10s. per week—the first year, and if he remains it is increased to 15s. the second, and 21s. the third year. The scheme is worthy of the support of those whom it is intended to benefit, and we hope it will be largely taken advantage of by parents and guardians who are on the outlook for a healthy and pleasant profession for their sons and wards.

THE PRESERVATION OF SCOTCH FIR TIMBER.

THE following description of Messrs. Conner & Co.'s process of preserving timber will be read with interest, as it appears to open up a new field of enterprise in the utilization of home-grown wood for building purposes that promises to be of great importance to large landed proprietors who have extensive fir plantations on their estates. This description of tree (and other soft woods as well), by the process that forms the subject of the article, can be endowed with one of the chief characteristics of hard wood, durability, without losing any of its present redeeming features, viz., softness and lightness, which in building operations are the chief desideratum. The process by which this change in the nature of soft and sappy woods is wrought is the invention of a Mr. Blythe, who, we understand, has been working it successfully in France for several years, but the patent works in this country are carried on by Messrs. Conner & Co., at Phoenix Wharf, Millwall.

Without going into the details of the process, which are not by any means hard to comprehend, it being one of the simplest and cleanest ways of utilizing creosote, oil of tar, &c., that we know of, it will be sufficient to say that the above firm have erected machinery, on a somewhat extensive scale, facing the river Thames, on which the premises abut. They have also just completed two immense cylinders or containers, the entrances to which are so constructed as to be on a level with the adjoining ground, into which the sleepers by a rapid process are placed to be steamed, or we should say saturated, with the creosote vapour.

By rails laid from the quay-side right into and through these containers or cylinders iron trolleys can run (each holding about a load of wood) from on board the ships or barges alongside the wharf; so that while in the course of discharging the wood delivered can be passed through the steam kiln as it were, and rendered almost imperishable without any necessity for stacking or repiling it. This is a great saving of labour, and consequently of rent; for by the time the vessel was discharged the greater portion of her cargo would be in a fit state for reshipment to some other destination; so that, if actually required, a craft could bring the raw sleepers to the wharf, have them preserved, and reload with them again as quickly as she could shift her moorings and take in cargo at another wharf—one of the principal merits claimed for Blythe's process being its rapid mode of operation.

The boiler-house of concrete is on the latest and most improved principle, with every modern appliance, and is fitted with two of Hawksley, Wild, & Co.'s (Sheffield) patent safety boilers, by which

sufficient steam can be generated to preserve 350 loads of timber, or 5,000 sleepers, per diem ; super-heaters are also added on the latest plan, and nothing appears wanting to make the premises and plans the most complete of their kind. Reservoirs or store tanks for the creosote are sunk in the ground, also entirely concreted, which are boarded over, the means of access being by hinge flaps or doors, so that they offer no disfigurement to the premises, and there is an absence of the noxious smell that creosote gives forth, notwithstanding that such large quantities of it are kept in close proximity to the works. Into these tanks steam is allowed to pass for the purpose of keeping the creosote in a fluid state by warming it. Without going further into a description of the works of Messrs. Conner & Co., which will well repay a visit, we saw enough in connection with Scotch fir to convince us that Blythe's process, when properly applied to the most sappy kinds of wood, gives a uniformity to the heart and the sap by apparently driving the latter out, and we were shown several specimens cut from sleepers grown in the neighbourhood of Woking, in Surrey, that had been operated on, which certainly looked as if the sap had been thoroughly got rid of.

We hear that Scotch fir sleepers can be cut and brought to London at near about the same rate that those from abroad can, and when once the wood has been through the process that forms the subject of these remarks, there is, we are assured, no difference in quality between it and those from the Baltic. Messrs. Conner & Co. will give their guarantee to this effect. In fact, the action of Blythe's process seems to be to put all kinds of wood on an equality so far as relates to durability. Scotch fir has the reputation of being an excessively sappy wood, and large landed proprietors on whose estates it may grow use it only for the roughest kind of carpentry, being obliged to go to the yards to purchase foreign deals and battens for the purpose of doing repairs to the homesteads and farm buildings. It is easy to see that if out of the softwood on their estates they could cut the stuff required in this way, and by Blythe's process of driving the sap out make the wood equal, and even superior, to Baltic fir, what an immense saving it would be to them. In fact these gentlemen (the large landed proprietors in the country) seem to us especially interested in the question of how far Blythe's system will enable them to look at home instead of abroad for cheap and durable timber. Pine plantations in England grow much faster than they do in the more northern regions, and if sap, which in rapidly grown wood is the prominent feature, can be rendered innocuous, almost a revolution would be worked in the wood trade.

Messrs. Conner & Co. have submitted to us specimens of timber that have been operated upon, in which the colour of the wood is but

slightly altered, though the grain is much closer. The great objection to ordinary creosoting is that the black stain all through it renders the timber totally unfitted for any other purpose than sleepers, piles, &c., but Blythe's process, beyond a slight smell of the creosote, which as the wood dries wears off, does not discolour or tarnish the wood in any way, so that it could be used, after having been thoroughly saturated with the vapour and the sap expelled, for floor boards, joists, or even joinery, according to the grain and the wood. Nothing in the appearance need prevent its being turned to any use required, domestic or otherwise. It is perhaps unscientific to speak of the sap being *driven out*, because we have no evidence of this; but from the fact of the nature of the wood being entirely changed after it has been subjected to the process we have here called attention to, it is evident something of the kind has taken place. We are, however, more inclined to think that in the process of getting rid of the sap some chemical combination takes place by which all tendency to decay is intercepted, and that atmospheric influences are thereby for some long period neutralized. How long, no one can say, as the test of ages has not yet been applied to it; but if it be found to preserve timber good and uninjured under circumstances which the natural wood could not endure without manifesting symptoms of decay, or that side by side with other processes this system keeps the wood sound, while those treated differently are already giving way, that is praise enough.

To make a post and rail fence that shall be enduring is a problem that has exercised the wits of foresters quite as much as trying to find the longitude has puzzled the brains of nautical men. Betwixt wind and water, or rather between earth and air, no wood has yet been discovered that will resist the moisture that lodges at the juncture named and soon exhibits the rotting effects of the dampness. Painting, charring, and dipping in boiling pitch have each been found useful, but only in degree. Two to half a dozen or ten years, according to the kind of timber experimented on, may have been added to the natural duration of a post so treated, but that is all. Decay at the ground level was only for a comparatively brief while postponed. But if all that Conner & Co. claim for the invention they are promoting is true—and the great expenses they have incurred and the trade they are doing seem to verify it—post and rail fences may hereafter be made as durable as stone walls, and the least valuable and softest wood on an estate may be made by their process more imperishable for farming and enclosing purposes than if the fine old oaks themselves were levelled to supply the need.

OUR ANNUAL TABLE OF PRICES.

THE season has come round once more when we must again solicit the kind assistance of our forester friends to supply us with the necessary material for the compilation of our annual Table of the prices realized for forest produce throughout the country during the past year. We have numerous expressions from our readers of the great interest with which they look forward to the annual publication of these prices in our pages, and we trust that foresters will heartily respond to our earnest desire that the table should be as complete as possible. The usual circular and form will be sent out early this month to all our forester correspondents and others whose addresses we know ; but we shall be pleased to send a form to any of our readers who may desire to assist by furnishing us with the prices of forest produce in their neighbourhood. We shall feel obliged by our correspondents filling up the forms and returning them to us as early as possible, so as to give sufficient time for properly tabulating the returns. Only average prices are expected to be filled into the forms ; but we shall be glad to get any notes of extra prices, or other information concerning the peculiarities of the locality and the markets, with which our correspondents may favour us. These notes are always interesting, and are valuable aids to an understanding of the greatly different prices obtained for the same description of produce in different parts of the country.

THE SCOTTISH PINE.

ERECT he stands, 'mid scenes so wild,
On Nature's bulwarks grey ;
His plume waves in the northern breeze,
The shadows round him play.

The bracken fern and blackberry
Spring up about his feet,
While heath-crowned rocks, or hoary crags,
O'er head oft nearly meet.

The storms that blow so fierce and strong,
Round many a summit bare,
Sweep down upon him. Yet he stands
Unvanquished monarch there.

O'er many a glen his sceptre sways :
Lone Rannoch, wild Bræmar,
The banks of Spey, and crooked Glass,
Lochiel, Glenroy, Cromar.

Although he loves his Highland hills,
 'Mong purple heath to stand,
 Yet we oft meet his stalwart form
 Far from his native land.

Give him the welcome he deserves,
 He's always brave and true ;
 Where others fail, victorious he,
 Shall wave his bonnet blue.

GIUBHAS.

5,



*A BRITISH SCHOOL OF FORESTRY :
 PRESENT POSITION OF THE QUESTION.*

THE argument of the preceding portion of the paper of which this is the continuation is that at present there exist facilities for organizing a British School of Forestry at comparatively little expense, if advantage be taken of existing facilities for the study of preparatory and accessory studies, and making provision only for what may be designated professional studies ; and an enumeration of what may be reckoned such was given in Vol. iv., pp. 781—787.]

To enable any one interested in the subject to compare this programme with what is followed in Schools of Forestry on the Continent, I may cite from a paper on Schools of Forestry, read before the Scottish Arboricultural Society, and published in the Transactions of that Society, Vol. viii., Part 3, the following account of the course of study then followed at Aschaffenburg. In the programme of study followed at Aschaffenburg, in Bavaria, which extends over two years and a half, during the first summer session attention is given to botany, zoology, the chemistry of vegetation, natural philosophy, mathematics, chart drawing, and political economy.

In the winter session following, instruction is given in forest economy, the game laws, botany, zoology, chemistry, mineralogy, atomics, hydrostatics, pneumatics, heat, acoustics, optics, magnetism, electricity, meteorology, trigonometry, mensuration of solids, and plan drawing.

In the second summer session there is continued the study of forest mensuration, meteorology, botany, zoology, chemistry, land mensuration, and plan drawing.

In the second winter course attention is given to the systematic management of forests according to different objects aimed at, and to the historical development of forest economy, forest technology and finance, the timber trade, the management of State forests, entomology,

organic chemistry, geology, road-making, dam-making, and bridge-building, and practice in forest mensuration in its every department.

In the concluding summer session attention is given to the practical application of all previous instruction, and instruction during excursions in the whole round of forest operations, instruction in forest administration, in rural economy, and agriculture, and in all works of forest engineering.

Facilities for the prosecution of field and forest studies abound in the vicinity of Aschaffenburg, but the excursions take in a wider range, and extend to the Black Forest, to the forests on the Rhine, and to the pine and fir forests of France. All the excursions are conducted by the professors or other teachers.

In the *Journal of Forestry*, Vol. i., p. 55, is given information in regard to the course of study followed at Nancy in France; pp. 81—87, that at Hohenheim in Wurtemberg; pp. 168—174, that at Carlsruhe in Baden; pp. 394—398, that in the Escorial, Spain; and pp. 545—551, 701—707, that at Evois in Finland.

From the influence of national usage I have a prejudice in favour of the study of a subject being prosecuted in class continuously from day to day till completed. But the usage in all existing schools of Forestry is otherwise, many different studies being carried on contemporaneously by different subjects being assigned to the same hour on different days. It appears to me that the advantages thus secured preponderate; and I think no difficulty need be experienced in so arranging these studies as to carry on several of them at the same time, by assigning the class study of them to different days of the week: and this, I may state, was the course followed at Aschaffenburg and elsewhere.

I have spoken of accessory studies, necessary, but not exclusively professional, and therefore distinguished from them.

Accessory studies comprise studies of every kind which may be made subservient to the management or administration of the management of forests; and that may be considered to comprehend all knowledge, and more especially every branch of physical science and its application in civil engineering, and every branch of natural history. But in the circumstances contemplated at present I would prescribe only studies for the pursuit of which facilities can be commanded which may be recommended by the teacher; or those studies for which a very pronounced bias is felt.

By availing themselves of existing arrangements for the study of all accessory studies as they do of existing arrangements for the preparatory studies, the founders of a School of Forestry may find their way cleared of many difficulties relating both to details of arrangements and to the limiting of the expense of remunerating

a somewhat numerous body of teachers. It is legitimate to do so ; to do so may be helpful to those by whom such arrangements have been made and sustained ; and it behoves the projectors of a School of Forestry to give their attention chiefly to the professional studies, and to expend their resources exclusively upon these.

I know nothing of the arrangements contemplated by the Scottish Arboricultural Society. Those submitted to the guardians of Epping Forest are detailed to some extent in the memorial presented to them by Mr. Mackenzie [ante, Vol., iv. pp. 675, 676]. For the information of readers who may not have a copy of that Memorial at command I may remark that the arrangements I have indicated above are not the same as his ; that I consider his scheme both in its entirety and in its details well deserves full consideration, more especially in view of the objects the accomplishment of which is sought by him ; but that what I have submitted also in my opinion deserves consideration in view of the more comprehensive object which I have in view.

There is yet another matter connected with the present position of the question of the organization of a British School of Forestry demanding attention. What probability is there now of trained and educated foresters finding employment ? I have not the means of forming an opinion in regard to such finding employment at home ; but I consider it probable that there will be ere long a demand for the service of such in several of our colonies.

Confining myself to reporting what has come under my own cognizance, I may state that during the *régime* of the late Ministry, by two successive Secretaries of State for the Colonies the subject was brought under the consideration of all the Colonies interested in the matter. The following statement I find embodied in a minute from Sir Henry E. Bulwer, late Lieutenant-Governor of Natal, to the Colonial Secretary, after a somewhat lengthened and accurate digest of my Plea for the Creation of a School of Forestry in connection with the Arboretum at Edinburgh :—

“10. I transmit Dr. Brown's letter and work (Dr. Brown to the Earl of Carnarvon, 13th April, 1877 ; ‘The Schools of Forestry in Europe,’ 1877) ; and I refer to them, and to the proposal he makes, because I consider that the information which he gives and his proposals are of considerable importance in themselves, and deserve our attention in this colony, if we would do anything, as I think we ought to do, towards the conservation and cultivation of forests, and towards promoting with that object some knowledge of Forestry for the benefit of the colony.

“11. What I think are the objects we ought to have at once in view are these :—

a. The conservation of what Crown Forests remain.

- b. Their economic management and utilization for the public good.
- c. The conservation of useful indigenous trees.
- d. The introduction and extension of useful forest trees.
- e. The prevention of indiscriminate destruction of woodlands throughout the colony.
- f. The encouragement of plantations and their extension.

"12. It is as regards the extent and condition, past and present, of forests and woodlands in this colony, and the most noticeable features of the rainfall and the climate of the colony during the past twenty-five years, that I desire the commission to inquire and report, as also to consider and report upon the several objects above named, and to make their recommendations, if they decide to make any, upon the best means of promoting these objects ; in connection with which it may, perhaps, be worth their consideration, whether it will not be for the advantage of the colony that a public Conservator of Forests and Meteorologist should be appointed, and a public nursery ground for the rearing of useful indigenous and foreign trees established, and whether any steps should be taken to promote the study of Forest Science."

A commission was subsequently issued to the First Puisne Judge of the Supreme Court, the Surveyor General, and others, who, under date of March 5, 1880, presented to the Governor a carefully-prepared report. In the closing paragraph they say : "The immense interest the subject of Forestry is now assuming, as evinced by the voluminous labours of Dr. J. C. Brown at the Cape of Good Hope, and the incessant applications of Sir J. D. Hooker, of the Royal Gardens, Kew, together with the spirit of fervid inquiry throughout the whole of the British Colonies, should impress upon this colony the necessity for intelligent action on the part of its European and native inhabitants, individually as well as collectively, which his Excellency the Lieutenant-Governor has pointed out."

In a fortnight the Lieutenant-Governor issued a brief Minute expressive of his interest in the report, noting its suggestions, inclusive of one that the services of some persons skilled in Forestry should be obtained. But a dark cloud was gathering over the land. He intimated that time failed him to do so at greater length, but suggested that the report should be laid before the Executive Council, and that it would probably be found useful to have it printed, which was done.

Since then the colony has been surrounded with war. War in the north, war in the south, war in the west. War, wars, and rumours of wars, and I suppose nothing further has been done in the matter ; but the whole contents of the Blue Book, like the citations which have been given, indicate that a demand is likely

to arise ere long in the Colonies for trained, educated, and instructed foresters, such as Schools of Forestry may supply, but for the supply of which the interval may prove by no means too long. Apparently the Colony of the Cape of Good Hope have had to go to Germany to obtain such a forester as was there desired. The Colony of South Australia has had to go to America to get our countryman, Mr. John E. Brown, as Conservator of Forests; and the reports made by him in that capacity show the benefit they have derived by securing the services of such a man. The Colony of Victoria owes much, and will throughout the whole future of the colony, to the labours of Baron F. von Müller; but his knowledge of modern Forestry was derived from the Schools of Forestry in his fatherland. Like things may be said of India and Dr. Brandis, and that without disparagement to Dr. Cleghorn and others, who prepared the way for his success. India and adjacent lands having shown the adaptation of German forest economy to the conservation, exploitation, and extension of forests under British administration, and the beneficial results obtained, the services of Major Campbell-Walker, a gentleman holding a high position in the Forest service in Madras, were procured from the Government of India by the Colony of New Zealand, to inspect the forests there, and report how like arrangements could be carried on; and his report proving eminently satisfactory, a like application for his services was made by the Government of the Mauritius.

In view of such movements the question arises, Where are these Colonies to procure the trained foresters they will require? It is a matter of notoriety, that for the Forest service in India, the training must be secured at great expense on the Continent of Europe, but the arrangement does not command the approval of many who are well qualified to judge of the case.

J. C. BROWN.





ENGLAND.

THE felling of oak and the stripping, stacking, harvesting, and delivery of bark will be the principal work of the month, to which everything else must give place. Careful felling should be insisted on for the sake of the stores left. The saw-cut for large trees should be as near the ground as possible, and such stools as may be expected to be reproductive should be well rounded off to promote the growth of the young shoots. In open spaces and hedgerows the trees will probably be grubbed, and a greater length of measurable timber may thereby be obtained. As soon as possible after felling the oak top should be cut up and faggoted, and both that and the timber be carted from the falls. This is the more necessary in plantations containing much underwood, as the young stools will soon be shooting freely.

Hedges and woodland fences of all kinds should be repaired at once, sheep and cattle being very destructive among the shoots in the spring and early summer. The practice of stacking the bark upon the smaller timber trees delays the clearance and keeps the woods open. Where the woods are of small size, the bark is better stacked outside or near main roads as soon as peeled. All horses going into the woods after the first week in May should be kept well reined up or muzzled.

Any remaining seeds should at once be got into the ground, and where early sown ones are appearing above the surface the intervals should be well hoed or otherwise loosened. The transplanting of seedlings may be continued in favourable weather, this being probably about the best time of year for handling small pines and firs. Large evergreens, such as laurel, yew, and holly, may also be removed, and such should be well mulched as soon as they are replanted. In dry weather, and especially when the plants have to be carried far, puddle the roots as soon as they are lifted. Coniferous seeds should at once be sown, and the seed-beds will want attention to keep off birds. All weeds should be drawn as soon as they appear above ground and before the roots strike deeply into the soil, as their removal later on disturbs the young plants, and may admit drought.

Grass seeds may still be sown, but in all cases the bottom soil should be firm and its surface fine. A proper selection of seed should

be made, and this should be adapted to the particular soil for which it is required. Renovating mixtures may also now be applied to lawns, parks, and wood-rides.

Cart all ditch scourings, mud, leaves, &c., to the compost heap, and afterwards mix it up with some lime, chalk, or old mortar. These, with the addition of some fermenting manure, will form a rich compost, valuable for the nursery or for planting out upon poor lands. Where clay is burnt for the nurseryman's use, the addition of a little lime at the time of preparation adds greatly to the value of the heap.

Owing to the long spell of dry weather and the high winds with which we have been visited, it will be necessary after rain to tread up and well fix many of the young trees which have been removed since the commencement of the year. Many of the tillers and young fir-trees in exposed situations will also require attention, the former being lightened in the head and the latter staked and tied where necessary.

Draining should at once be finished, and road-making, enclosing, &c., for additions to the nursery or future plantations may be undertaken as time permits. Young hawthorn and other hedges should be dug or hoed and well cleaned, if they are to grow out strong in the bottom.

Where seed-beds have become battered down by heavy rains their surface may be loosened by light raking, or by drawing a light spiked roller across them if there is danger of disturbing the rising plants.

The evergreen pruning should be finished early in the month that borders and lawns may be put in order, and the last rolling given to newly-gravelled roads and footpaths.

Throughout the month there will be ample work in the nursery in transplanting, manuring, digging, and clearing vacant spaces, hoeing among the young plants, undercutting strong plants for whose removal time has not been found during the past season, watering, and other things which the season may require.

A. J. BURROWS.

SCOTLAND.

ON account of the severe and protracted winter and spring through which we have just passed, forest work generally is in a very backward state. Planting operations have been very much retarded, and much work, which it was intended to carry out this spring, has had to be delayed until the autumn or next spring.

In the nursery the sowing of coniferous seeds should be completed early in the month; as also the transplanting of evergreens and seedling conifers if not already done. Crop vacant lots with green crops, using well decomposed manure. Weed seed-beds, and keep

the hoes and rakes going in the killing of weeds. If this is well attended to this month, it will save much labour during the season.

Prune and dress up shrubberies, cutting back all shrubs which have been damaged by the severe frost of the past winter.

Complete the cutting of deciduous hedges at once, as also evergreens and box edging.

Look over all recently formed plantations, and see that the plants are firm in the ground. All specimen trees and shrubs which have been recently transplanted, and which are likely to suffer from drought, should be timeously and copiously watered.

See that all plantation gates and fences are in good order before stock is turned out on the neighbouring pastures.

The peeling of timber, the bark of which is used for tanning purposes, is generally the most important work of the month; vegetation having yet made but little progress, barking operations will not be general till at least the middle of the month. It is, however, important to have everything which is required for the work in readiness, so that there may be no delay in beginning as soon as the bark will rise. As much as possible of the work should be accomplished early in the season, when the bark weighs better and is also more valuable to the tanner. A dry and airy spot, convenient to the work, should be selected on which to harvest the bark, and rather than do so in a sheltered or humid situation, it should be carted some distance off.

A great amount of injury has resulted to numerous trees in our woods and plantations from the heavy falls of snow during the past winter, by the breakage of many of the branches. Where these fractured branches have not already been removed, this should be done before the leaves expand. Avoid close cutting to the stem or bole of large branches as much as possible.

D. S.

IRELAND.

A COLD east wind prevailing during the greater part of April has retarded vegetation very considerably. The fields and woods are still very barren-looking, yet oak-peeling is commenced on most estates. This is the great work of the month, and nothing should interfere with its progress. Early-stripped bark is by far the best. When stripping, the bark ought to be placed on the drying-stand, every day's work by itself. With the fine drying wind we are having, the bark, if not too thickly put together, will soon be in good order to put into a rick. It is well to get as much of it into rick as possible without it getting any rain. This is an essential point in saving bark.

Recently transplanted trees ought to be carefully attended to, watered if necessary, and the earth made firm round about them. The past season has been a very trying one for transplanted trees ; it is therefore all the more necessary to look them over.

On newly-planted ground additions may be required to the drainage. This will be found a suitable time to have any corrections made, as damp places will show themselves now.

All planting in the nursery ought to be finished off before now. The sowing of conifer seeds may still be done ; but there is no time to lose with such work, as the season is far advanced.

Keep down all weeds in grounds and walks ; this is a very important point in successful nursery work.

D. SYM SCOTT.

WALES.

A GREAT part of the past month has been a continuation of cold easterly winds, greatly retarding vegetation. Consequently, from the backwardness of the season, oak-bark stripping will be considerably later than last season. The delay in commencing barking operations will give an opportunity of pulling forward any other work, which may have been kept behind by the severity of the winter, &c. The principal occupation of the woodmen during the present month will be oak-peeling, which should be pushed forward as fast as possible with the first rise of the sap. Have all bark put on the ranges each night, or oftener if found necessary, as the work proceeds ; keeping it well off the ground, and thin on the ranges. As soon as the bark gets sufficiently dry it should be secured in stack or shed as circumstances permit.

As stock will now be turned into the pastures, all fences should be in good repair, also tree guards and rabbit-proof netting. Clean and loosen the soil about hedges by hoeing or light digging.

Look round recently-formed plantations, and see that all the plants are firm and upright, especially where the ground has been trenched or ploughed. Newly transplanted trees and shrubs should be watered, and have the stakes adjusted where necessary.

The nursery will now require attention in the way of hoeing and digging between the plants, and keeping the ground free of weeds.

Attend the shrubberies and pleasure grounds by digging, raking, mowing, rolling, &c., as occasion requires.

LEWIS S. BAYNE.

BRITISH TRACES IN DEAN FOREST.

A T recent meeting of the Cotswold Naturalists' Field Club, Mr. John Bellows, of Gloucester, read a very interesting paper on this subject. He commenced by referring to the well-known building in the centre of the Forest called the "Speech House," mainly used now as an hotel, but in one large room of which the courts for the administration of Forest matters are held. The name of this edifice, which was erected in the time of Charles II., is, he said, derived from the circumstance of its having been used at one time for the holding of a mine court called the Court of Speech. Besides the woods of oak and beech covering the slopes of the hill on which the Speech House stands, Mr. Bellows noted the very considerable number of hollies, which give to the spot a character differing from that of every other portion of the Forest; remarking that though unquestionably the growth of these hollies had been encouraged on account of their affording winter browse for the deer formerly kept in the neighbourhood, there were other circumstances connected with the place which made it probable that another and still more curious reason existed for their abundance round this locality. Many of the hollies are of great age, the life of the plant being of very long duration. In proof of this latter statement he mentioned one specimen of holly, standing by the side of the archery ground, upon which more than thirty years ago a lad had cut his name as follows: "F. J. Gibbins, Neath, 18 August, 1849." The carver of this inscription was a near connexion of a member of the Cotswold Club, and he (the lecturer) had known him for many years. Two lines, as if scratched with the point of a needle, drawn as guides for size of the letters, still remain as fresh as if done yesterday. But a few generations of self-sown hollies such as this would, he observed, tracing backward, bring us to a remote period in history. Mr. Bellows then alluded to visits which he had paid last year to the "Fugoe" and "Chysauster," the remains of two ancient British villages in Cornwall. At both of these places, amidst the furze and heath growing on the banks which cover the old ruins, he found old holly trees "standing guard like solitary sentinels over the storyless Pompeii buried below." Every one who knows the Cornish downs would agree with him that a holly tree would be the last thing to expect in such spots as these. The plants were undoubtedly the produce of seedlings from a precedent succession of trees, as in the case of those at the Speech House, but owing to the unfavourable soil and climate of the Cornish moors no more than one or two trees had survived, owing to the seeds accidentally falling on deep soil and in a sheltered situation. He took it that the hollies were planted near these British dwellings because the original inhabitants associated with the plant some idea of sacredness or holiness. In support of this contention he adduced the following evidence:—First, that such plants were used by the Greeks and Romans for adorning their temples at festivals such as the Saturnalia; which custom was adopted in the decoration of so-called Christian churches and so has come down to our own times. Secondly, that the name of the tree in the northern languages is *Krist-torn* (Christ's

thorn), and throughout the north of Europe, including Britain, there was a superstition associating the tree with the Saviour Himself; which was evidently the result of the policy of the priests and monks in making conversion to Christianity attractive by retaining the old beliefs and practices of heathenism under a new nomenclature. From this policy we have such legends as that of the Glastonbury Thorn having been the walking-stick of Joseph of Arimathea; and such a belief as that which lingers on in Cambridgeshire at the present day, that if the holly with which the house is decorated at Christmas is removed before Candlemas-day, the prosperity of the tenant will vanish with it for the rest of the year. In the same passage of a book from which this statement is quoted, entitled "Forests and Forest Trees," by Ingram Cooke (1853), it is stated that "it was formerly an article of belief that, unknown before, the holly sprung up in perfection and beauty beneath the footsteps of Christ when He first trod the earth, and that, though man has forgotten its attributes, the beasts all reverence it, and are never known to injure it." In the third place, further proof of the superstition connected with the holly tree is found in the name itself, which, on the authority of Loudon, is stated to be a corruption of the word "holy." Fourthly, the lecturer continued, in the Forest of Dean, from the clanship which has subsisted from all time among the natives, several old customs have come down to us with less alteration than in many other parts of the country; and it is remarkable that within the memory of persons now living, say down to some fifty years ago, every oath taken in the Verderers' Court in the Forest was sworn upon a stick of holly. From all this, and especially from the last-mentioned fact, it is evident that the holly was regarded as a "holy tree." The Celtic, or ancient British name of the tree, as represented by its Cornish form, was Celyn, which meant a "grove-tree," or, if he might coin a form to represent the word exactly, a "grover." This fact, taken in connection with the universal veneration paid to the tree as "holy," seems to show clearly that the holly was the tree chosen by the Druids to form the groves by which they surrounded their sacred oaks. The holly tree was, from its natural characteristics, peculiarly suitable for such a purpose. Sacred groves of this kind, in the midst of a wood, not only served as religious but also as military rallying points, and in Cæsar's Commentaries might be found an account of the taking by the seventh legion, under the shelter of the testudo, of a British "town," which, according to Cæsar's description, would have been nothing more than a thick wood, fortified with a ditch and rampart to serve as a place of retreat against the incursions of their enemies. The lecturer noted the name of the spot alluded to by Cæsar, which was "Anderida." He traced the meaning of this name from the Sanskrit word "daru," meaning a tree. This word was brought by our Celtic forefathers in their western migration from India, but, as they also brought with them that special veneration for the oak which was general among eastern nations, they came to restrict the term "daru" or "dar" to that tree *par excellence*. "Da" was the Celtic word for good or "holy," so that "an-daru-da" (Anderida) would mean "the holy oaks." Another singular piece of cir-

cumstantial evidence was the survival of the translated form of this name, viz. "Holyoak," which exists as a personal name. The shortening of the vowel "o" in the name "holy tree," making it "holly tree," would be according to the general rule in modern English compounds having the word "holy" for their base, *e.g.* "holiday," "Holy-well," "Holy-wood," and "Holy-oak," and our local name (at Sharpness) of "Holly-hazel," which is probably a kindred word to the last quoted, as the hazel too was reputed a "'holy' tree." Returning to the site of the Speech House, the lecturer continued:—The fact of this spot having been selected for the principal government lodge in the Forest implies of itself a strong presumption in favour of its having been previously used as a general rendezvous for the district: a presumption which its commanding position on the line of Roman Road from Gloucester would tend to confirm. The Roman paving shows plainly through the present metal of the road at several points between the Speech House and the railway station at the foot of the hill. There are several points in which the Forest district differs from the vale of Gloucester, which are the result of habits and traditions that have come down from the Celtic period. Among these I may mention,—1st, the type of features of the people, which is a strong Celtic one, as any one may see for instance in the portraits of miners, given in Nicholl's *History of the Forest of Dean*; 2nd, the use by the Forest miners of many technical words which are Celtic; 3rd, the strong clannish spirit which manifests itself even to the present hour in a jealousy of outsiders, whom the Foresters politely describe as "foreigners;" this being the tradition that has come down from the days when the Saxon and the Celt were fiercely pitted against each other with the Severn as their boundary. In the fourth place the lecturer noted two peculiarities in the buildings. The Forest of Dean was, with Wales, one of the districts to which those Britons who could not brook the Saxon yoke retreated. In each of these districts—the Lake district and Cumberland, the Fylde of Lancashire (the marshy area west of Preston, from Fleetwood to Lytham), Wales, and in Cornwall, Devon and the Isle of Portland in Dorsetshire, and the great Forest of Essex, now dwindled down to the area called Epping Forest—it would be found that as a rule the peasantry whitewash their cottages, while in the more Saxon districts this is the exception and not the rule. Whitewashing the outside of houses is therefore a Celtic custom, and this custom exists in the Forest of Dean. The other peculiarity in building is the existence of wattled houses in the district—this form of building having also descended from Celtic times. There are several examples of this wattling on the borders of the Forest of Dean, especially at Longhope. The effects left by such influences as those exercised by the Druids upon the minds and customs of the people might be expected to be most traceable at the present time in such places as the great forests, which have been least liable to disturbance from the progress of innovation. This was shown by instances in other forest districts of the country. Another instance was taken from the time or period of holding the courts for the administration

of Forest government. In all other assemblies which are periodically convened for public affairs, the times at which they fall due are weekly, fortnightly, monthly, or so forth: that is to say, they accord with our usual divisions of the year. But the Verderers' Courts at the Speech House recognise no such interval. They are held every *forty* days; and we have historical evidence of their having been continuously so held for more than six centuries. The "*Charta de Foresta*," dating from the 9th year of the reign of Henry III.—that is, from the year 1225—among a variety of other matters specifies that the Verderers of Forests should hold their courts "*every 40 daies*" (for such and such purposes). Strong arguments are adduced to show that by that provision an already existing and even then very old custom was merely preserved and continued. When it was mentioned to the lecturer that the Verderers' Courts were held every forty days it occurred to him that this number would be the exact result of a division of the year of 360 days (which was the *Druidic* year) by *nine*, and that *nine* was a number held by the Druids in special veneration as a sacred or lucky number. Among the fragments of evidence from which insight can be obtained into the customs of the Druids may be reckoned some of the names of places in England, as well as names of persons. There are, for example, two or three places in Gloucestershire and one well-known one in London, called "*Nine Elms*," which recall to us a period when the veneration for the number nine led for some reason to the planting of elm trees in groups of *nine*. In the keeping up of what is called "*May-day*" in different parts of Europe, we have several strata of customs overlapping, and in some instances what a geologist might term "*faulted*." The oldest of them point to the same origin as that shown by the languages of Europe, *i.e.* a common home in India, while some of the latter point to Greek and to Roman times respectively. The lecturer proceeded as follows:—"Recollecting that the Gaelic stock is the oldest of our British races and the least affected by Roman influence, we cannot but attribute this veneration for the number nine to the period before the Romans came to this island. Now let us return to the Courts held in Norman or Plantagenet times, in the Forests of England, and see how fully some other details respecting them bear out the idea that the periods at which they were held were British periods continued by both Saxons and Normans. The document known as the '*Miners' Laws and Privileges of the Forest of Dean*' dates, as is shown by Nicholl, from the time of Edward I. (1272). Yet the preamble of this states that it contained customs and franchises that were granted time out of mind, and after, in time of the '*excellent and redoubted Prince King Edward*,' and so on. This language points to a far older establishment of the said customs than that of the preceding reign of Henry III., yet we find the perambulations of the forest made in the reign of Edward specified as being performed by four of the king's justices, the chief justice in Eyre, *nine* foresters in fee, four verderers, and twenty-four jurors. Who can fail to see with the clue before us, that this company is partly the result of the Norman selection as to numbers—4, 24, and so on—and that the *nine* foresters are chosen at the suggestion of the foresters themselves, and therefore in

accordance with their ancient custom ? . . . Not only was the Court of attachment or Verderers' Court held as we have seen at forty days periods, as the *ninth* of the year, but there were *three* ranks of court, *i.e.* two higher than the Verderers'. The first was the Swainmote (free tenants) Court, which was held every 120 days—or *three* times a year, and the highest of all, called the Court of Eyre, was held once in *three* years. The last of these high courts for the Forest of Dean was held at Gloucester Castle, some 250 years ago. In the lower court, *three* witnesses were required, swearing with a stick of holly held in the hand: the bounds were perambulated every *three* years, and even the Justices in Eyre sat *three* on the bench at the *triennial* court. I think no one can doubt, in view of all the evidence I have adduced, that in the court still held at the Speech House we have the last vestige, though perfect in itself, of the grand system of the Druids in Britain."



THE YEW TREE IN MUNSLEY CHURCHYARD.

THE following is an extract from an interesting paper on yews, contributed by the Rev. Samuel Jenkins, F.G.S., curate of Munsley, to a recent number of the *Hereford Times*:—The yew tree in Munsley churchyard is, I think, worthy of a niche among famous yews. Its girth at the bottom is 23 feet 3 inches. The trunk is here most bulky, as it tapers slightly upwards. The main trunk is very short, not above 6 feet 6 inches, after which it spreads out into a large number of well-developed branches, which are full of foliage. According to the circumference of the trunk, the diameter will be 7 feet 4 inches. Again, the branches cover a diameter of 48 feet 9 inches, or a circumference of 153·1530 feet taking as the basis of our calculation, 1:3·1416::diameter:circumference. This again will give us an area of 1872·285425 square feet, or a little above 206 square yards. The tree appears very vigorous now. It is, however, partially decayed inside the trunk, as there is a hollow not quite circular two feet two inches in diameter.

What is the approximate age of this Yew Tree? It is a well-known fact that the yew tree is of the slowest growth and greatest durability of all European trees. The method of ascertaining the age of trees that have well-developed annual rings cannot be applied very successfully to the yew owing to its exceedingly slow growth. Mr. J. E. Bowman, F.L.S., wrote a most interesting article in the *Magazine of Natural History* for 1837, entitled, "The longevity of the Yew, as ascertained from actual sections of its trunk." In this article Mr. Bowman says:—"A tree during its life is always, at least for a portion of every year, in a state of growth; the wood first deposited soon ceases to minister to the purposes of vitality; but its fibre remains, and is surrounded and enveloped by other rings composed of new fibres and vessels, elaborated through the medium of new leaves and spongioles, annually produced. So that in an old tree its earliest wood remains, though concealed within; and we see only the parts created within the last few years. These possessing the vigour of youth, a natural capacity exists of

carrying on the process to an indefinite period, so long as the exterior of the trunk, the leaves and rootlets escape the accidents to which they are exposed.

De Candolle says of the measurements he made of the layers of three yews, one of 71, another of 150, and a third of 280 years old, he found as the result that the yew grows a little more than one line annually in diameter in the first 150 years, and a little less from 150 to 250 years. He adds, "If we admit an average of a line annually for the very old yews, it is probably within the mark; and in reckoning the number of their years as equal to that of the lines of their diameter, we shall make them younger than they really are. The average diameter of 18 yews growing in Gresford churchyard, near Wrexham, North Wales, in 1840, was 20 inches. It is recorded in the parish register that they were planted out in 1726. Allowing these trees to be 10 years old when planted, this would give an average growth of two lines in diameter annually. De Candolle measured a magnificent female yew tree in Darley-in-the-Dale, Derbyshire. He found the circumference of its trunk to be 28 feet 4 inches. Its age he calculated at about two thousand and six years.

There is not, as far as I can ascertain from those living in the parish, any account whatever of this yew tree in tradition or document. The only account any one seems to be able to give of it is the same as Topsy gave of herself, "It grewed." But how long ago, we have no available evidence beyond that supplied by its internal structure. Let us, then, apply De Candolle's method, and endeavour to find out its approximate age. Its circumference at the bottom is 23 feet 3 inches, and its diameter 7 feet 4 inches. Now, allowing 24 lines to the inch, we have here 2,112 lines. If we divide this by two, as we have taken in the two opposite sides of the circle, it will give us the radius, the distance from the centre to the circumference. This will give us 1,056 years as the age of Munsley churchyard yew tree.

What an idea! Had our tree a tongue, as Shakespeare says that trees have, what a long tale it could unfold! How many strange incidents could it relate, even of the quiet little rural parish of Munsley! Surely man must have an hereafter, else the yew tree would laugh at his longevity, in comparison with its own, as he struts away his short existence here. The stripling yew tree planted last year could afford to laugh heartily at the Bradlaugh incident, because long centuries after he, according to his own account, will be annihilated, and his commotion utterly forgotten, the yew tree will be revelling in pristine vigour. Nay, man is surely better than a tree.

If our calculation is correct, our yew tree was planted in A.D. 825. By whom? It was planted during the reign of Egbert, the last king of the Saxon Heptarchy, twelve years before he died. It saw the rise and fall of the Anglo-Saxon monarch, while it was yet a tender tree measuring 14 inches in diameter. When Alfred the Great ruled with such marvellous wisdom, our tree could afford but very meagre shelter to man, bird, or beast. When the Danes arrived here, our tree would only have increased two inches more in diameter. When William the Conqueror arrived, he would have found our tree only one inch and a half more. When King John signed the Magna Charta, it would have grown one foot ten lines more. When Edward I. subdued Wales, and added it to his own kingdom, it would not have increased another eight inches in diameter.

Supposing Munsley churchyard to have been the burial-place from that time till now, there are no less than three thousand generations of the "rude forefathers of the hamlet" sleeping quietly around our venerable tree, await-

ing the Resurrection. It must have witnessed the funerals of all these. What changes have taken place since it was first planted! How many times has the ownership of the parish changed hands? Thrones, empires, dynasties, have faded away since then. Names, illustrious in their day, are now buried in deep oblivion, the dust of ages hides them. Our tree still stands; its foliage is fanned by zephyr winds, and if no accident happen, many generations of our descendants will admire its majestic appearance.

QUEENSLAND TIMBER.

FROM a very interesting pamphlet by Mr. Walter Hill on the Queensland timber, we extract the subjoined note concerning *Araucaria Bidwillii*, the Bunya Bunya Pine—"A noble tree inhabiting the scrubs in the district between Brisbane and the Burnett rivers. In the 20th parallel it grows thickly over a portion of country in extent about thirty miles long and by twelve broad. The wood is not only very strong and good, but it is full of beautiful veins, and capable of being polished and worked with the greatest facility. The cones produced on the extreme upper branches, with their apex downwards, are large, measuring 9 to 12 inches in length and 10 inches in diameter. On coming to maturity they readily shed their seeds, which are 2 to 2½ inches long by 1 inch broad, sweet before being perfectly ripe, and after that resemble roasted chestnuts in taste. In accordance with regulations issued by the Government the tree is not allowed to be cut down by those who are licensed to fell timber on the Crown lands, the fruit being used as food by the aborigines. The trees produce some cones every year, but the principal harvest happens only every three years, when the blacks assemble from all quarters to feast on it. The food seems to have a fattening effect upon them, and they eat large quantities of it, after roasting it at a fire. Contrary to their usual habits they sometimes store up the Bunya nuts, hiding them in a water hole for a month or two. Here they germinate, and become offensive in taste to a white man's palate, but are considered by the blacks to have then acquired an improved flavour. The taste of the Bunya when fresh has been described as something between a chestnut and a raw potato."





The difficulties which landowners and their agents now experience in the letting of vacant farms, especially where such happen to consist of heavy arable land, should lead them to do all in their power to encourage tenants to lay down such to pasture. In many cases the tenants would be quite willing to do this provided the seed were found; and a better investment of money cannot be made by the owner. A discount of 10 per cent. is an immediate advantage to a needy tenant; but an outlay of 15 or 20 per cent. upon permanent pastures, warm cattle sheds, liquid manure tanks, drainage, &c., will prove a lasting boon to the occupier, and a future source of greatly increased value to the landowner.

* *

During the unprecedented hard winter we have passed through, few of our readers will fail to have noticed the influence it has exercised on insectivorous birds. Owing to the long continuance of intense frost, birds were entirely prevented from picking up anything in the shape of insects, or their commonest food, hence their attacks upon many of our forest trees. Scots pine, elm, lime, birch, and planes, seemed to have suffered severely; the birds pick the inside from the buds, which accounts for the empty shells found lying under trees so attacked. It has been noticed as a strange circumstance, that during hard frosts the planes suffered severely, but during the time the snow covered the ground they were scarcely touched: the Scots pines were not so fortunate, however,

and the snow under the trees was thickly covered with scales and buds.

* *

It is somewhat early as yet to speculate on the prices which oak bark is likely to realize this season, but in the Midland and Southern counties of England especially, the outlook appears far from hopeful. We are informed that there is still a good deal of last season's bark offering in the London market at the prices current last July, so that it would be hardly justifiable to expect higher prices at present. One correspondent in Berkshire describes oak bark as a drug in the market.

* *

The same correspondent informs us that the price of oak has gone back 30s. to 40s. a load since last year, and that good elm has been sold as low as 5d. per foot.

* *

In consequence of a recent magisterial decision, under the Highway Act, holding timber merchants liable for damage done to roads by hauling timber over them, the buyers, at several of the large sales this season, have endeavoured to protect themselves by throwing, unfairly, as it seems to us, the responsibility on to the seller. At a recent sale on one of the estates of the Duke of Beaufort, the timber dealers having refused to purchase any timber without a guarantee indemnifying them against any claim that might be made by the highway boards for damage to the roads in hauling, catalogues were sent round to the dealers, to which was appended a clause stating that "an indemnity will be

given against any charge for extraordinary traffic."

* *

The recent dry weather has been indirectly accountable for several forest fires which have been reported in the newspapers, by which in some cases much damage has been done. On the 17th of last month a fire broke out in a plantation of young firs, on the estate of H. F. Lindsay Carnegie, Esq., of Kinblethmont, near Leysmill, Forfarshire, by which fully half the trees in the plantation were destroyed. It being impossible to get water to the conflagration, the fire was, after a time, extinguished by lashing it with bushes of broom. We also learn that on March 30th a spark from a passenger train ignited the plantation on the mountains known as the Craig-yr-esq, Pontypridd, owned by Mr. Francis Crawshaw and Lord Tredegar. The fire at once, and the whole of the mountain side was soon burning. The loss will be very great.

* *

Amongst the most recent additions which have been made to the treasures placed under the care of Mr. Jackson, the curator of the Museums at Kew Gardens, is an interesting collection of the various objects manufactured in France from native-grown woods. This has been presented by Colonel Pearson, who has had special facilities for making such a collection, he being the gentleman under whose care are placed the Indian forest students, who are sent to Nancy to acquire the knowledge of forestry, which is supposed to fit them for the administration of our vast forests in India.

* *

We have constantly in these pages urged the advantages of transforming certain kinds of arable land into plantations, and if it were not for the very depressed state of agriculture, which is the cause of such a proceeding, we might almost con-

gratulate ourselves that our advice is being followed. We learn from a contemporary that an Essex landowner is seriously thinking of planting a 100 acre farm of very heavy clay with oak and elm. The owner and his family are wealthy, and sooner than see their property altogether out of cultivation, they prefer to make an investment which will undoubtedly return a good rate of interest some fifty years hence.

* *

There seems to be a desire in some quarters to introduce piece-work in forest operations to a greater extent than is at present the case. Perhaps some of our readers who have had such work as planting, felling, ditching, &c. done by piece-work will give us some information as to the prices they have paid and whether they have found the system successful.

* *

The annual show of the Bath and West of England Society is to be held this year at Tunbridge Wells, the fashionable Kentish watering-place. Being near to London and easy of access by rail from all parts of the country, we anticipate that it will prove one of the best and most successful shows ever held by this old-established and prosperous Society. Handsome prizes are offered for all kinds of agricultural stock, as well as for articles produced by other branches of rural industry, and for which the district of Kent and Sussex is celebrated. Great interest is being displayed in the matter by the inhabitants of the South-Eastern district, and we hear that the entries are likely to be unusually numerous.

* *

It is neither gratifying nor encouraging to those who are striving for the higher education of British foresters to have to record that at the examination in forestry, held by the Highland and Agricultural Society, in Edinburgh, in March last, there was but one solitary candidate. Mr. Alexander Inglis, of Edinburgh,

received the apparently uncoveted distinction of a second-class Forestry certificate of the Society.

* *

We are glad to learn that the Mechi Fund, which was started on the death of the late owner of Tip-tree Hall with the view of making a suitable provision for Mrs. Mechi and her daughters, through the instrumentality of the Duke of Bedford, the Earl of Leicester, Mr. Samuel Morley, M.P., Mr. James Caird, C.B., and other influential friends of the deceased gentleman, has reached the sum of £4,400. In order, however, to secure an income to Mrs. Mechi, of not less than £200 a-year, an additional £700 is required, and this sum the Committee are endeavouring to raise by a further appeal to the general public.

* *

We understand that the Duke of Westminster has appointed the Hon. Cecil T. Parker to be agent for his Eaton Estates, in Cheshire. Mr. Parker has for several years held the agency of the Earl of Chester's estates, in Dorset, Somerset, Wilts and Devon.

* *

According to one of our American contemporaries, a new system of draining, by means of creosoted wood culverts, is about to be employed on some new railway works. The drain described is 8 ft. in diameter. The material used is timber, properly spiked and fastened. The main feature, the barrel, is built of staves $6\frac{1}{2}$ in. wide by $2\frac{1}{2}$ in. thick, sawn to the proper level and firmly doweled together. Two intermediate bed-pieces are laid down, as cradles, to receive the barrel. Iron hoops, $\frac{3}{4}$ in.

in diameter, say 10 ft. apart, will hold the barrel together until puddled filling is packed carefully up to a height equal to that of the centre of the culvert. The filling can then be continued up to grade, and the bank trimmed and finished.

* *

The employment of dynamite in the removal of decayed timber, stumps of trees, brushwood, &c., was favourably testified to, as the result of some experiments recently held in Paris, in the Bois de Boulogne. The success of dynamite for superseding the axe in felling timber was not, however, so manifest, as it was found very difficult to localize its destructive action, and in some cases the trees which it was intended to fall were completely shattered by the force of the explosion.

* *

An historical tree has lately been destroyed in Greece—a cypress described by Pausanias 400 years B.C., and one of the two largest in the Peloponnesus. Some 160 feet high, the tree had a diameter at the base of ten feet, and a circumference of twenty-five feet at man's height, and of 240 feet where the branches were most developed. Some careless gipsies camping in its shade set fire to the tree, not a vestige surviving.

* *

We are glad to learn that the *Manual on Injurious Insects*, which Miss E. A. Ormerod is passing through the press, is approaching completion. The illustrations, of which we have seen a specimen, are executed in a very superior manner, and will add much to the value of the book.





THINNING PLANTATIONS.

SIR,—We are indebted to Mr. Michie, Mr. Brown, and others, for their interesting and remarks on the important subject of "Thinning Plantations," and if I may be allowed to express my opinion, and add a few words for the furtherance of the discussion, which to my mind has been barely opened, and the most important principles practised when that operation is going on are not yet brought to light; my purpose is not to ignore, jar with, nor contradict what has been written, but simply to endeavour to throw out one or two suggestions which I think are of as much importance as "when" to thin and the "distance" they ought to be apart.

For instance, I have a plantation of mixed fir and hardwood to thin, say from 20 to 25 years of age, and first I observe that one or two kinds of the fir show symptoms of decay, by their sickly and unhealthy appearance, whilst the others seem to be in a thriving state; of course I am supposing the plantation to have been thinned two or three times previously, and would at this stage be about pit-prop size, standing say from 4 to 8 ft. apart.

With such a plantation before me, may I ask what course I ought to pursue with it? Some will tell me to go and mark the apparently unhealthy and open out the hardwood; others will say I ought to take the height of the trees, and then calculate the distance apart they ought to stand and then proceed, taking due care that each tree stands at an equal distance apart from each other.

This may be all very well as far as it goes, but acting on these con-

siderations alone is perfectly ridiculous, for to mark the apparently unhealthy I most probably am taking out the very trees that ought to stand, and which if left would surpass and outlive the now apparently healthy trees, and to cut down a good fir tree for small scraggy hardwood that has been long confined underneath it, or for to mark with a view of getting the remaining crop at an equal distance, is simply preposterous; so that I conclude, to proceed in this manner would only lead me to commit the most serious and fatal mistakes, and that I must have some other groundwork to act upon before I presume to commence operations.

In order, then, that I should be somewhat fitted for the task assigned me, methinks I would display more prudence by carefully considering those principles of practical forestry which alone will enable me to form a sound basis, and qualify me to discharge my duty in an efficient and satisfactory manner.

The first and most important rule that I must observe and get the mastery of is a thorough knowledge of the soil and subsoil, and the trees that it will bring to maturity with the greatest possible yield, and then which of these will be the most likely to satisfy the local demands, and will yield the most profits.

Then the situation of the whole plantation, age, and previous treatment must be considered, in order to ascertain the quantity that can safely be taken out without materially injuring the remaining crop.

After this, respect must be paid to the natural habits of growth of each kind, in order to give each the necessary room to grow and develop themselves into right shape, as well

as for their roots to expand and get a firmer hold of the ground.

Again, should the plantation be exposed, it is necessary to operate upon it at the best and proper time, viz., the spring and summer months.

After I have duly considered these rules, and drawn my conclusions as to what I ought to cut, in quantity, kind, and appearance, and what tree is the most likely to succeed on the ground, yield the most profits, and give the best effect, and stand as the permanent crop, may I not safely proceed with the work, giving due care to each particular head, and clear away all comparatively useless and ineffective trees, however small and however large a gap they may cause? for which is more unsightly and injurious, a small, stunted, useless tree, or an open space, generally called a gap?

As to the exact distance apart I will leave them, I say nothing, and utterly disregard rules and measurements beyond what I have already considered, viz., to give each tree sufficient room for light and air, which will cause the distance to vary so considerably that I do not consider it necessary for me to dwell upon it; but briefly it will depend upon the distance they were first planted, the kind of tree, size and situation of each, and the position of the whole plantation.

The reader will observe that I have paid no regard whatever to the thinnings, and have treated them so far the same as I would do weeds in the seed-bed, so that I quite agree with Mr. Michie on this head. Yet there are one or two points in his remarks that I cannot fully comprehend, and I do not really believe that he practises what he says, when he asserts that fir trees ought to be thinned when the side branches begin to meet each other, when he speaks of a plantation requiring thinning for the first time, though, doubtless, his meaning is quite right

yet I better understand Mr. Stalker's way of putting it at page 730, Vol. iv.

THOUSAND-HEADED KALE.

SIR,—The manner in which this crop has resisted the frosts of the past winter should induce all stock-keepers, who wish to insure early and abundant spring keep, to go in for its cultivation. Those who wish for an abundant crop for folding off in the autumn, or early winter, should drill in the seed at once, about 3lbs. to the acre and from 27 to 30 inches apart in the rows. Give plenty of good rotten dung, and sow about 1 cwt. of nitrate of soda per acre over the young plants when horse-hoed; well stir through the summer, single out to about 24 inches, and run the double mouldboard plough up the rows in July.

A. J. B.

THE BLISTER ON LARCH.

SIR,—I am never afraid at being pitched into; on the contrary, I believe a bellicose tendency in a discussion is conducive of beneficial results in so far as it divulges vulnerable from invulnerable points; predominating as it were the correct, and sending the erroneous off at a tangent. It is to be remarked here, however, that I am not writing because "challenged" to do so; neither do I take the pen as a critic. This latter proposition is a "talent" I have got to acquire, an "ability" I am not presumptuous enough to claim. This disclaimer on my part need not detract from the views of the more "enlightened," whose opinions are always solicited in the *Journal*. As I cannot refer (several correspondents have lately developed wonderful power, in referring to something or other previously written, without stating where such writings are to be found—a singular method of conducting a discussion) to anything "I have written on this subject several years

ago," I will content myself by giving my opinion here now, trusting such of your readers, including Mr. D. F. McKenzie, Murthly Castle, who have "accomplished all the particulars" of the subject, and who, "after years of careful and laborious study," are competent to deal with the matter "to the satisfaction and edification of fellow readers," will exercise all the freedom I am now using and prove to your readers where I am wrong.

Looking at the blister, it is found under the thick, scaly bark of old trees as well as under the thin bark of young trees. Those in the habit of peeling larch have observed blister in all its stages. It is covered, *i.e.* immediately under the outer layer of wood; this usually bursts on a succeeding growth, contracts round it, and the syrupy matter it contains mixes with and neutralizes the proper sap, rendering the surface covered with the matter exuded from the blister inert. The bark dries up, the spot becomes dead withered. I have yet to learn any one ever saw the blister enlarge itself upwards! My own observations have always found the extension of the wound downwards from the spot. This in my opinion explains any mystification surrounding the presence of large external ulcerations found on larch. Of course, the dead bark, as each succeeding annual growth swells round the dead spot, is forced away from the wood, ultimately falls off, and the wound heals over. Be it observed, blisters do not always burst; when this is the case there is no *external ulceration*. If blisters do not burst before the second layer of wood covers them the fluid becomes semi-crystallized, in which state I have often met with it when cutting up larch timber.

Blister being the cause of these external disfigurements, often seen on larch, it becomes us to ask what is the cause of blister? It has been stated that the *Aphides* (I use the

term *Aphis*, not that I believe the insect an *Aphis* but from a popular habit) attacking the extreme points of the branches causes the sap to be thrown back on the bole, rupturing the sap vessels on the stem. I have already stated (page 527) my views on this point, but will repeat them. The *Aphides*, owing to the extreme minuteness of their suctorial tube, are compelled to select the thin and more succulent portions of the bark to the thick, corky parts. This accounts for their freshness at the extreme points of the branches. The insect is suctorial in its habits, sapping the life-sustaining element of the tree, but this does not prove that the sap is thrown back. Admitting that the sap is interrupted, the question is, would it flow backwards? I think not. It would rather strengthen existing branches or force out new buds. Cut off a portion of a branch and report the result!

Late and early frosts with all their concomitants are by another class of foresters held forward as the cause of blister. It would be interesting to know how frost acts upon trees. One would expect that as the sap freezes it swells, causing rupture in the cells, but when we consider how often plants are frozen without any serious inflection the theory becomes untenable. Indeed, all experience proves a certain amount of elasticity by which vegetation restores itself. True, I have seen in heavy Canadian logs a disease called "punk," which is generally admitted to be the effects of frost, but nothing approaching to it in the home forests.

As far as my experience goes I have observed blister most prevalent among trees growing on land previously under tillage, especially where lime had been applied as manure; also on dry and barren soils, and also wet, sour, retentive tills, and peaty deposits.

Larch when planted on such soil usually gets covered with blister,

which indicates that it is to the nature of the soil we have to trace the disease. The true cause of disease is, in my opinion, when the sap is precipitated in the cellular tissue from being planted on ground not suitable for the tree.

Now, sir, having said this much, I shall be highly gratified and surprised if the gentleman who challenged me can prove any of the foregoing remarks wrong.

D. SYM SCOTT.

Ballinacourte, Tipperary.

THE DOUGLAS SPRUCE.

SIR,—In a number of the *Journal*, some months ago, I noticed a recommendation to plant this tree in conjunction with the larch. This valuable timber tree grows on the eastern slopes of the Rocky Mountains to a size of two to three feet in diameter, at an elevation of six to eight thousand feet, in connection with *Pinus ponderosa*, *P. flexilis*, and *P. contorta*. *Abies Engelmannii*, *A. Menziesii* and *Picea pungens* also grow with it at the base of the mountains. As an ornamental tree for lawns and plantations its light green foliage contrasts beautifully with *Pinus ponderosa* and the silvery *Picea pungens*. Transplanting it from the dry Rocky Mountains to this altitude in a rich soil it flourishes, and promises to be an excellent timber tree.

On the Pacific slope it flourishes in all its glory, and under the name of "yellow fir" furnishes the finest lumber, much of which is shipped to China, Japan, and the islands of the Pacific Ocean. The region where it is so abundant is the only one on the continent of any extent which has not been invaded by the lumberman. Another year or two will complete the Canadian Pacific and the Northern Pacific railway, and these grand forests will fall before the woodman's axe. Puget Sound, which has a shore line of 1,800 miles and a most secure harbour, then will be the greatest

ship-building point in America. A tree of the Douglas Spruce cut the past year near Olympia, Washington Territory, measured 112 ft. to a limb, entirely free from knots and straight as an arrow. It was cut into four mammoth logs. For masts this tree cannot be excelled, the timber possessing all the qualities of strength, elasticity, and durability.

J. T. ALLAN.

Omaha, Nebraska, U.S.A.

EFFECTS OF THE SEVERE WINTER.

DEAR SIR,—The effects of the last severe winter are now beginning to show on the shrubs and trees here. Nearly all the gorse has gone brown, and the common bay laurels are either brown or shedding their leaves. Evergreen privet has also shed its leaves; many of the hollies in the hedges are dying, especially in shady places where they have not had sufficient sun to ripen the wood properly, and, worst of all, many of the Chili pine (*Araucaria imbricata*), some of them over twenty feet high, have the last year's growth hanging brown on them.

There are two varieties here; one has a smaller leaf than the other, and it is the small-leaved variety only that is affected. H.

P.S.—Of course I need hardly say that many of the less hardy plants have died also, such as laurestinus, cotoneasters, rhododendrons, and other sorts.

DECAY OF UNDERWOOD STOOLS.

SIR,—In reply to "E. S.," I am glad that he has noted one of the results of an evil system of underwood and tree cutting, which produces stools, doomed to early decay. I sent to you illustrations of the marked differences between the growth of trees and underwood from high and low cutting; the high cutting leaving stools (suitably so named), the low or flush-with-ground

cutting leaving "stubs," but not stools. It did not interest you sufficiently for publication at the time, but science, which is the foundation of good forestry, will bring this important matter to the front in your pages.

J. A. KING.

Gerrard's Cross, Bucks.

HOW TO DESTROY FIELD MICE.

SIR,—Will some one kindly inform me what is the best way to kill field mice, where they are in large

numbers in small plantations? I had numbers of young fir trees destroyed by mice last winter. The snow lay for some three months, and they worked under it, completely barking the trees.

ABERDEENSHIRE.

SLIDE RULES.

SIR,—I should be obliged if any of your readers could tell me where I could procure a slide rule; also, if there is a book of instruction for using it to be obtained, and at what price?

SYLVIO.

THE RIGHTS OF TIMBER VENDORS.

AN important decision, affecting the rights of landed proprietors to hold a lien on trees sold by them, was recently given in the Court of Appeal in the case of *Wilkins v. Hoare, Bart.* It was an appeal by plaintiff from the judgment of Joseph Brown, Esq., Q.C., delivered after the trial of the cause by him sitting as Commissioner at the last Gloucester Assize. The action was brought by Mr. Walter Wilkins, as the trustee in the bankruptcy of Messrs. John Ford and Henry John Ford, against Sir Henry Ainslie Hoare, Bart., the owner of landed property known as the Stourhead and Knoyle Estate, in the county of Wilts, to recover damages for the wrongful conversion of 554 oak trees, of the value of £699 6s., sold by the defendant to the Messrs. Ford in April, 1879.

Mr. Jelf, Q.C., and Mr. Anstie were counsel for the appellant; Mr. Staveley Hill, Q.C., and Mr. A. T. Lawrence were for the respondent.

The facts, as stated in the opening of the learned counsel for the plaintiff, were these:—An arrangement was entered into between the parties through Mr. Thomas O. Bennett, sub-agent to Sir Henry Hoare, for the purchase of the trees in question, payment for which was to be made

within four months from the 29th April, 1879, and which trees were to be removed from the land in six months unless special permission was given that they might remain longer. They were accordingly marked, felled, and stripped of their bark, the whole of which latter, of the value of £150, was taken away by Messrs. Ford, with Mr. Bennett's knowledge and assent. In June, 1869, the trees were measured, and valued at the rate of 2s. per foot, as agreed on, and an account rendered by Mr. Bennett to Messrs. Ford, who accepted. In the following month the Messrs. Ford were in difficulties, a fact which became known to Mr. Bennett through dishonoured bills in other transactions, and he accordingly took steps to protect the interests of the vendor, Sir Henry Hoare, by entering into an arrangement with the Messrs. Ford to give them further time for the payment of an aggregate sum of £1,844, in which they were then indebted to Bennett, on their giving him an authority to receive the proceeds of certain contracts which they had entered into with the Great Eastern Company. On this, however, becoming known to Mr. Longburn, the solicitor and head agent of Sir Henry Hoare, he at once repu-

diated the arrangement, and the Messrs. Ford shortly after became bankrupt—the plaintiff being appointed their trustee. The plaintiff, however, claimed to have a lien on the trees then lying on his grounds, and refused to deliver up possession, on which the present action was brought. The learned judge reserved judgment, and subsequently gave judgment in London in favour of the defendant. From this ruling the plaintiff now appealed.

Mr. Jelf submitted that as the 29th of August, when the trees were to be paid for, had not arrived, there was no lien on the trees, and that the defendant had already parted with possession when he allowed the Messrs. Ford to take away the bark, which was as much part of a tree as its branches or trunk.

Lord Justice Lush said he quite agreed with that. (Laughter.)

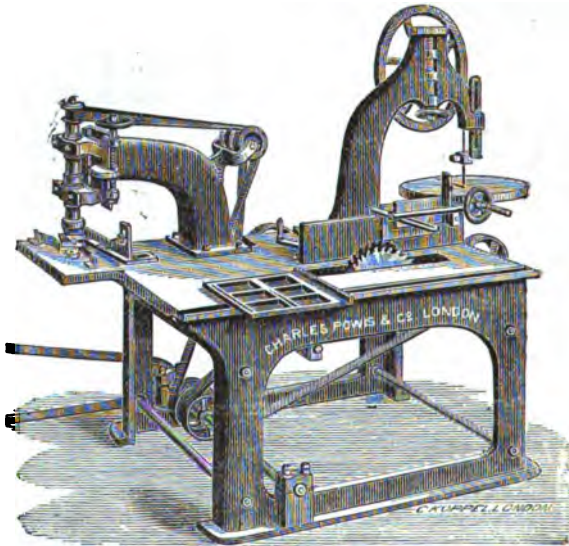
Lord Justice Bramwell, in giving judgment, held that the contract in dispute did not possess any property in the trees and timber. It only gave a right to a contract which should possess the property.

Lord Justices Baggallay and Lush concurred, and the appeal was, therefore, dismissed.

NOTES AT THE RECENT BUILDING EXHIBITION.

ALTHOUGH the Agricultural Hall, in Islington, is principally known in connection with the famous Cattle Shows which have been held there of late years, yet it is occasionally put to a variety of other purposes, and it was thrown open from the 4th to the 18th ult. for the exhibition of a vast

number of manufactures and appliances in connection with the building trades and arts. Many of these have direct interest for foresters and those concerned in estates management; so that we consider a brief account of some of the exhibits which came under our observation will not be out of place, nor unacceptable to our readers. We proceed then to mention a few of the appliances which are deserving of consideration, and for the better elucidation of them we annex illustrations where possible.



C. POWIS & Co.'s CARPENTER AND ESTATE JOINER.

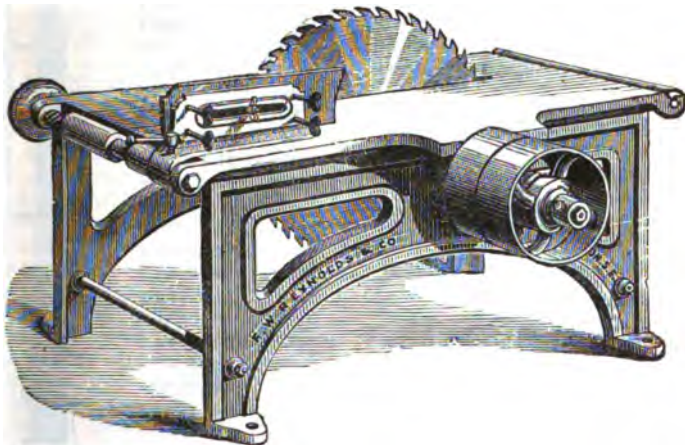
Commencing with wood-working machinery, we first of all noticed an entirely new machine, manufactured and exhibited by Messrs. C. Powis & Co., of Millwall, London, for performing certain operations in the cutting and converting of wood for various purposes, never previously effected in one machine, consisting of a circular saw, band saw, recessing, moulding, and housing machine. The circular saw is mounted so that it is perfectly clear of the other parts of the machine, and is fitted with a cross-cutting slide, and the spindle has a rising and falling motion adapting it to fulfil all the purposes usually required from what is known as a joiner's bench, viz., sawing, rabbeting, grooving, tenoning, and moulding. A long

fence is fitted, having an angular movement, and is carried along the face of the saw a sufficient distance to allow the tenoning apparatus to travel the distance necessary to make the tenon, and for which purpose two saws are used, or the tenon may be made at one operation by using the makers' patented disc cutters. The band saw is fixed in such a position as to be entirely free, and wood of any length may be cut into any curved, irregular, or ornamental design; it is driven by a counter-shaft self-contained in the machine, whereby its motion is independent of any other part, and it is fitted with patent tension apparatus to secure equal tension of the saw at all times. The recessing is performed at the opposite end of framework to that occupied by the band saw, and may be employed for a variety of uses, such as making straight or curved mouldings, groovings, and every other purpose to which a recessing machine can be applied. It is claimed that simplicity of parts is attained in the combination of these three machines, together with thorough effectiveness.

that it should be as easy to move and fix as is compatible with efficiency, and this requirement seems to be fully met in the one under review. It is lighter than the saw bench adapted to the continual work and high speed of a saw-mill, and can be fixed in a very short space of time, by means of four coach screws, to either a floor or two transverse deals firmly wedged into the ground.

The fence-plate is made to cant to any angle for feather-edging, and can be turned off the table for cross-cutting. *There is also a fine screw adjustment*, by means of which its distance from the saw may be regulated with the utmost accuracy. The table is fitted with a roller at each end to assist the wood on and off. This bench is fitted with improved pullies (not shown in the drawing), which always ensure a tight driving-belt when working.

We also annex an illustration of Messrs. F. W. REYNOLDS & Co.'s improved portable engine, fitted with patent feed water-heater, &c., which raises the feed to near the boiling point (200 deg.), saving much fuel and wear and tear of fire-boxes and tubes.



F. W. REYNOLDS & Co.'s CIRCULAR SAW BENCH

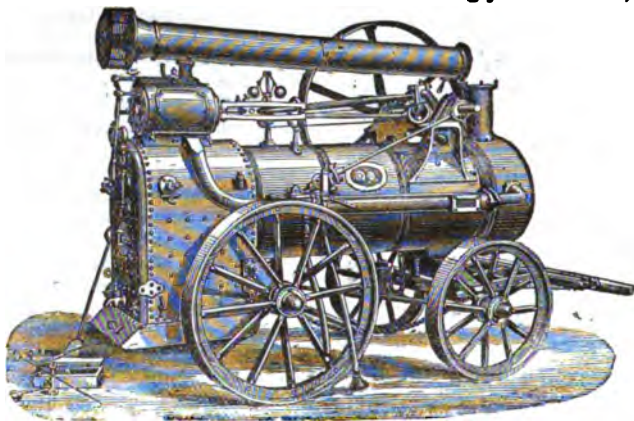
The above illustration represents a cheap and serviceable saw bench, adaptable for estate purposes, turned out by Messrs. REYNOLDS & Co., of the Acorn Works, Edward St., Blackfriars Road, London, and which is well deserving of attention.

When a saw bench has to be frequently moved from job to job, it is necessary

It is also fitted with patent steam blast tube-cleaner, which entirely dispenses with the use of tube brushes. By the simple movement of a handle, a powerful blast of steam is introduced into the chimney, instantly withdrawing from the tubes all soot and other obstructions. The cylinders are steam-jacketed, and their diameters, together

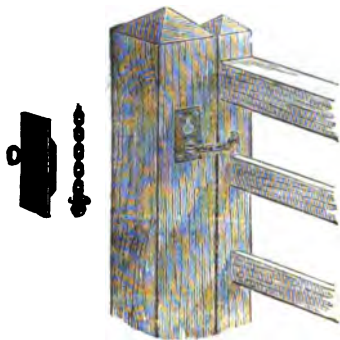
with the lengths of stroke, are very large. The boilers contain an average of 18 square feet of heating surface per horse power, and the fire-boxes are large enough to burn any refuse or common kind of fuel, such as wood, straw, &c.

padlocks (which are continually getting mislaid or broken) they will be found very economical. They can be readily unlocked and fastened by persons on horseback, and as the key is only required to unlock them, they are exceedingly convenient, besides



F. W. REYNOLDS & Co.'s PORTABLE ENGINE.

Messrs. G. F. and H. BRAGGINS, of Banbury, Oxon, exhibited their patent hunting gate locks, which are simple and secure for all purposes where padlocks are generally used, and more especially suitable for out-doors. The construction and position of the locks, when fixed (see illustration), prevent-



G. F. & H. BRAGGINS' HUNTING GATE LOCKS. ing any water remaining in them, and the inside part being manufactured of brass, they are not liable to corrode or get out of order from exposure to the weather. The locks themselves are fixtures, and consequently cannot be mislaid or lost. The first cost is the only one, and contrasted with

saving time. The same firm also exhibited their patent adjustable top hinge and double-action bottom hinge for park, lodge, villa, wicket, and other gates. The manufacturers claim that gates fitted with this top hinge are materially strengthened in what is usually their weakest part, viz., the connection between top-rail and heel; the iron strap securing the tenon of top-rail firmly in the mortise and strengthening the tenon from the side strain caused by jarring when gates are closed with force. The horizontal eye-bolt, passing loosely through the heel of gate and vertical eye-bolt



BRAGGINS' DOUBLE-ACTION BOTTOM HINGE.

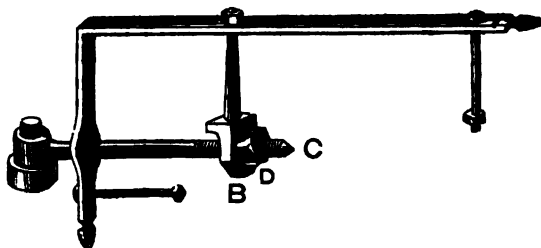
B, is secured with the nut D, so that the connection betwixt top-rail and heel is entirely relieved from the weight of the gate, which is carried direct from top-rail (where intersected by eye-bolt B) to the hook-pin, and this cause of gates dropping at point is effectually prevented. Should the hanging post give, during wet weather, or from other cause, by simply turning the nut D on the screw C the point of the gate can be raised or lowered at will, so as to allow it to swing clear of the ground and *always open and close properly*; the slight extra cost of these hinges upon the price of those commonly in use is more than counter-balanced by the saving effected in wear and tear of the gate, in addition to the great convenience of persons passing through either on foot or horseback.

The bottom hinge is constructed upon an entirely new principle, so that the gate to which it is attached will not remain open unless secured, neither can it be lifted or thrown out of gear, which is so often the case with the ordinary hinges constructed upon the old rack and staple pattern, and compared with which it will be found to be in every respect superior. Combined with the patent top hinge they supply, as far as is practicable, a perfect set of gate hangings.

For the purpose of demonstrating how admirably common woods may be made to imitate those of a costly character, Mr. H. C. STEPHENS, of 191, Aldersgate Street, exhibited a number of specimens of ordinary deal treated with his well-known stains, so as to resemble oak, mahogany, rosewood, ebony, walnut, and satinwood, and the effect was considered a great success.

In the way of carts, carriages, &c., Messrs. INWOOD & RAWLINS, of St. Albans, led with a very nice show, chiefly noticeable being the "Cyprus" Carriage, the vehicle of the season, exceedingly light, and convertible into four different forms—viz., phaeton, waggonette, four-wheel dog-cart, and char-a-banc. There was also the No. 1 "Crown Prince"

Tandem Dog-cart, fitted with Inwood's improved self-balancing apparatus. This invention enables the driver, by simply turning a handle with his right hand, to move the body of the cart to and fro, with any number of persons or amount of weight in the vehicle, with perfect ease. By this means the weight can



BRAGGINS' ADJUSTABLE TOP HINGE.

be equalized when ascending or descending a hill, or on level ground, without checking the pace of the horse.

JOHNSON BROTHERS & Co., Limited, 6, Waterloo-place, Pall Mall, S. W., are patentees and manufacturers of imperishable horticultural buildings, skylights, verandahs, and roofs of all kinds where glass is required, and they exhibited an example of a Peach House, to illustrate their system of constructing curved roofs without bent glass, with either zinc or copper bars, and without putty or other perishable materials, together with an example of their patent swing fruit-tree protector, in which the usual objection to such appliances is overcome by making them to open in such a manner as to expose the trees to the free atmosphere, when it is desirable to do so.

Concrete building is getting much into favour, and the specialties in this department exhibited by Messrs. DRAKE & Co., of the Railway Works, Battersea Park, attracted considerable notice, particularly their patent complete iron concrete building apparatus, and their patent dove-tailed self-fixing concrete building slabs for building monolithic concrete walls with finished faces, requiring no plastering.

A Rustic Cottage was shown by Messrs. IHLEE & HORNE, of Aldermanbury, London, for the purpose of practically illustrating the marvel-

lous power of Dalmain's Patent Luminous Paint. All daylight was shut out by means of close blinds, and the walls and ceilings being coated with the paint, the room was illuminated, so that one could see to read a paper, or tell the time by looking at a watch.

Of garden edging, tiles, and other articles of that description, there was a good display made by Messrs. EASTWOOD & Co., of Wellington Wharf, Belvedere Road, Lambeth. Conspicuous also were the exhibits of edging and various shaped copings, made by Messrs. HONGES, BUTLER, & DALE, of 9, Bridge St., Westminster.

In the way of drain-pipes, so essential on estates, there was a varied selection on view, at the stand of Messrs. THOS. SMITH & Co., of Canal Bridge, Old Kent Road, London, consisting of glazed stoneware socket drain-pipes; ditto, with half-sockets. H. J. Jone's patent drain-pipes. Glazed stoneware bends and junctions, together with gullies of improved form and large size, traps, channel pipes, and sewer curriers, &c.

Prominent amongst the exhibitors of such requisite articles as bricks, was Mr. CHAS. WOOD, of 63, Sherland Road, Paddington, London, who, acting as agent, submitted a good assortment of white and red moulded bricks, &c., from the Hathern Station Brick Co., Leicestershire; Saltley bricks (pressed facings and moulded), manufactured by Garlick & Co., Saltley, Birmingham; Pickwell's bricks (white facing), manufactured by the Patent White-Pressed Co., Hull; grey, purple, and brown Luton bricks, manufactured by Mr. Lockhart; white, coloured, and ornamental glazed bricks; also red rubbing and facing bricks of various kinds.

A variety of useful articles was exhibited by Messrs. S. & E. RANSOME & Co., of 10, Essex Street, Strand, among them being Naish's patent rapid drilling machine, shown in operation, driven by gas engine, together with other drilling machines of different patterns and sizes. Noticeable also was DIXON's patent balance portable crane, with adjustable jib, to pick up and carry loads from one place to another, besides a quantity of pulleys, jacks, and other lifting tackle exhibited by the same firm.

THE BRITISH TIMBER TRADE.

RESULTS OF RECENT SALES.

THE sales of British timber have recently been very numerous, and as a guide to the prices which have been realized, we make the following selections from the reports which appear weekly in our useful contemporary, *The Timber Trades Journal* :—

DORSET.—On March 24th, Messrs. H. Duke and Son held a sale at Midlemarsh of about 1,000 oak trees (including small timber) and 205 ash trees, the result being highly satisfactory. The standing timber was only of a small description, but the felled lots of oak were of large metings and very good, realizing from about 1s. to 1s. 5d. per ft. The whole of the lots offered were sold, the principal buyers being:—Mr. J. Ayles, Ringwood; Messrs. Mulford, Southampton; F. Griffin, Salisbury; and J. Perris, Middlemarsh.

SURREY.—Burstow Park Estate Timber Sale.—On Monday, 28th March, the timber upon this estate was submitted to public competition by Messrs. White & Sons, at Laker's Hotel, Red Hill Junction. The lots consisted of 1,210 oak, some of large dimensions, 282 ash, and 70 elm trees. There was a large attendance of timber merchants, but a general depression appeared to pervade the trade, and the biddings were very tame and listless, some of the lots being declared unsold by the auctioneers, but we were informed that these were afterwards disposed of. The prices realized were: for oak, 1s. 9d. to 2s. 3d. per foot; ash, 1s. 4d. to 1s. 6d.; elm, 9d. to 1s. In reply to a question put to the auctioneer, it was elicited that the highway authorities of the district would not consider the removal of this timber "extraordinary traffic," under the Highways Act. The sale realized about £2,450. The principal purchasers were Messrs. William Stenning & Son, of Red Hill; D. W. Largeton, Maidstone; H. Longley & Son, Turner's Hill; J. Stenning & Son, East Grinstead; Turner & Son, Maresfield; and Varnham & Barnard, Godstone.

WILTS.—On March 30th, Messrs. Waters, Son, & Rawlence held a

sale at West Dean of the annual fall of timber on the Norman Court Estate, comprising 784 oak trees and 346 flitchers, the gross amount realized being £1,231. Best quality fetched from 2s. to 3s. per foot, and second quality, 1s. 9d. to 2s. 3d. There was a good attendance, and the sale was tolerably brisk. Among the buyers were J. Andrews, Totlow; F. Griffin, Salisbury; Mulford Bros., Northam; Fletcher, Eling; Andrews, Amesbury; Longley & Sons, Worth; Sandy, Foreham; Hawkins, Andover.

HANTS.—Messrs. Raynbird & Sons held their annual sale of English timber at Basingstoke, on the 30th March. There was a good attendance of local and other buyers. The falls of timber on the Hackwood, Oakley, Ashe, Preston, and other estates were offered, and about 60 lots sold. Oak realized from 1s. 6d. to 2s. 1d. per foot; ash, 1s. to 1s. 9d. per foot; beech, 6d. to 1s. 2d. per foot. The chief buyers were, Messrs. Mulford, White, Stephens, Wallis & Co., Ridley & Sons, Blake, East, Ings, West, Jewett, Pain, Webb, Inward, Ben, and Knight. The biddings were kept up with a fair amount of spirit, and the sale may be considered a satisfactory one.

HANTS.—On March 31st, Messrs. McKenzie & Son held a sale at Broxbourne of timber, standing with lop, top, and bark, with the following results, which were considered satisfactory:—571 oak trees and poles, containing 2,165 feet, realized £292, or an average of 1s. 5d. per foot; 146 oak trees, containing 2,151 feet, realized £225 10s., average 2s. 1d. per foot; 70 oak trees, containing 979 feet, realized £102, or 2s. 1d. per foot; and 185 oaks, ash, and elm, realized £612, equal to 2s. 2d., 1s. 6d., and 9d. per foot respectively.

SCOTLAND.—A sale of wood took place a short time since in the Warren Wood, Glamis. There was a fair attendance of purchasers, the principal being Mr. Henry Young, Mr. James Anderson, Mr. George Duncan, Mr. David Duncan, and Mr. Watson. There were upwards of 400 lots, and they realized fair prices.

On April 2nd, about 300 lots of cut timber, consisting of ash, larch, and spruce, on the Airlie Estate, were sold at Alyth. The attendance was

good, and the prices realized fair, the hardwood bringing the highest figures. The chief purchasers were Mr. Colin MacDonald, Alyth; Mr. Ewan, Forfar; Mr. Duncan, Lundie; and Mr. Oaler, Dundee.

A sale by tender took place recently at Cams Hall, Fareham. A small lot of beech, &c., was disposed of to a merchant at Portsmouth at about 8d. per foot in copse (cut and copped). The oak timber sold easily in copse standing, at about 1s. 6d. per foot; a local builder bought the lot. Timber is generally selling much better this year than last.

ESSEX.—On April 1st, Messrs. Stanford & Duvall held a sale at Borted Hall, near Colchester, of about 100 oak and ash timber trees, and about 5,000 bays and softwood poles, &c. There was a fair attendance, the biddings were decidedly brisk and good prices realized; the oaks were small, and made from £11 10s. to £4 each. There was a good demand, and the principal buyers were Mr. Langton, of Maidstone; Mr. Beaumont, Colchester; Mr. Matthews, Myland, Colchester; Mr. Reeve, Colchester; Mr. Hawkins, Colchester, &c.

YORK.—On April 1st Messrs. Waite & Crouch held a sale at Doncaster of timber on the Hampole Estate, consisting of 1,139 trees and 998 poles. Lot 1 comprised 367 oak, 65 ash, 45 elm, and 5 cherry trees, along with 487 poles, and was sold for £1,000. Lot 2 comprised 471 oak, 136 ash, and 50 elm trees, along with 512 poles, and realized £1,310. The buyers were Messrs. Haigh & Son, Gildersome, and Messrs. Elwis & Son, Doncaster.

ESSEX.—On April 4th Mr. Cheffins held a sale at Deben of 56 ash, 50 beech, 8 sycamore, 90 elms, &c. Among the buyers were Mr. Keen, Mr. Kalmer, Mr. East, and Mr. Geere, of London, Mr. West, of Braintree, Mr. Turpin, of Haverhill, and Messrs. Woods, of Brandon. The trade for beech was slow, the average price being about 1s. per foot. The sycamore sold well, as did the elm and ash. For the latter there was a very brisk demand, one tree, containing about 130 ft., realizing £23.

SURREY AND SUSSEX.—On April 5th Messrs. Mellersh held a sale at Godalming of 4,100 oak trees, 86 ash, 89 elm,

&c. The competition was not very brisk, but subsequently all the lots but one or two were disposed of. The prices ranged from 90s. to 100s. and 105s. per load. Messrs. Mulford, Child, Wood, Stenning, Agate, Barnes, Marshall, Taylor, Brooker, Puttock, and Elliott were the principal buyers. Considering the quality of some of the timber, higher prices ought to have been obtained, but the sale of English oak is no doubt much affected by the enormous foreign supply in the market at low prices.

HANTS.—On April 6th Mr. E. Eames held a sale at Basingstoke of 770 oak, 54 beech trees, &c., on the Grange Estate, near Alresford. The oak, which was not of large metings, nor of heavy bark-producing quality, but very spiny, made from £3 15s. to £4 7s. 6d. per load standing. The felled beech made from 8d. to 1s. per foot cube. The tone of the trade was quiet but healthy, being well represented by many of the principal buyers, amongst whom were Messrs. Hy. Longley & Sons, Wm. Turner & Sons, Mulford Bros., E. White, Talbot, jun., Darvell, East, Barnard, &c. Bark a quiet trade. All the lots were sold.

BUCKS.—On April 7th Messrs. Harrison & Son held a sale at Tingewick, near Buckingham, of 188 oak trees. There was a capital number of buyers present, and the trade seemed brisk, more especially for the larger trees, one or two making as much as £13 or £14 per tree, or about 4s. per foot, which is rather an unusual price about here. Messrs. Barratt (Oxford), Tibbetts (Buckingham), Allen (Twyford), Sanders (Akeley), Higham, Liddington, Mayo, Rush, and Waite, of Silverstone, were the principal buyers.

LEICESTER.—On April 7th Messrs. Shouler, Sons, & Walker held a sale at Eastwell of 165 elms, 41 beech, 23 larch, and 23 ash trees, &c. There was but a small attendance. The demand for ash and beech was good, but the elm met a very slow trade. Larch, 1s. per foot. The principal purchasers were Messrs. Goulding, Worksop; Lamb, Peat, and Ashworth, Nott ng-ham.

YORKS.—On April 8th Mr. J. Weatherell held a sale at Richmond of timber growing on the Hipswell Es-

tate. Lot 1 consisting of 360 larches, 36 small oaks, and 17 ash, standing in Tindale Bank, containing about 2½ acres, was sold to Mr. Lewis, Richmond, for £108. Lot 2, consisting of 750 larches and 100 poles, standing in the North Bank Wood, containing about 5½ acres, was sold to Mr. Spence, Ripon, for £201. Lot 3, consisting of 350 larches, was not sold; £150 was bid, but that was £25 under the reserve price. About 8d. per foot was obtained for the larches. A low price had to be taken in consequence of the difficulty of getting out the timber.

SCOTLAND.—There were sold, by public roup, on April 9th, on the estate of Thornton, Laurencekirk, belonging to Mr. Alexander Crombie, about 220 lots of cut trees. The attendance was small, but bidding was brisk, and the whole was sold off at good prices. The principal purchasers were Messrs. Thornton, Waterside; Mathers, Mill of Luther; Watt, Dowrie Burn, &c.

AUCHINBLAE.—About 200 lots of cut trees in the Den of Paldy Fair, belonging to Mr. James Farquharson, of Glenfarquhar, were sold by public roup on April 9th. There was a large attendance, and good prices were obtained. Single larch trees sold from 7s. 6d. to 29s. each, and Scots firs from 3s. 6d. to 10s. each; hag, from 3s. to 7s. per lot. The principal purchasers were Messrs. Brand, Mains of Fordoun; Hendry, Denmill; Fairweather. Drumsleed; Ogg, Fricockheim; D. & J. Milne, Auchinblae; James Milne, do., &c.

OXFORD.—On April 11th Mr. James Nash held a sale at Eynsham of 120 trees. The prices realized were about as follow:—Oak, 1s. 5d. per ft.; ash, 1s.; and elm, 9d. The purchasers were Messrs. Fowler, Stornfield; J. Denton, Oxford; C. Stone, High Wycombe; J. Pimm, Eynsham.

SUSSEX.—On April 12th Messrs. J. C. Vidler, Son, & Clements held a sale at Battle of 1,002 oak trees, with lop, top, and bark, on the Ashburnham Estate. The total amount realized was £2,420, which was equal to an average of about 2s. 3d. per foot. There was a fairish demand, and among the buyers were Messrs. Parsons Bros., Turner & Son, and F. Winsor.

Mr. Charles Hunt offered for public auction, at Horeham, on April 13th, 500 oak trees, standing in the parish of Capel, Newdigate, Leigh, and Rudgwick. There was a large attendance of buyers. The result of the sale was as follows:—Lot 1, 82 trees and tellers, on Swins Farm, Capel, to Messrs. J. & S. Agate, £185. Lot 2, 98 trees in Well Copse, Newdigate, to Messrs. Taylor & Brooker, Dorking, £175. Lot 3, 150 trees and 13 tellers on Shillwood Farm, Leigh, to Messrs. Taylor & Brooker, £197. Lot 4, 170 trees, on Lodge Farm, Rudgwick, to Mr. Charles Child, Sinfold, £198. The result was considered very satisfactory.

HAWKS.—On April 14th Mr. David White held a sale at Basingstoke of 800 oak trees and 1,200 oak saplings, on the estates of the Duke of Wellington. The prices maintained throughout were very satisfactory, and among the buyers were Mr. E. C. White, Basingstoke; Messrs. J. Longley & Sons, Worth, Sussex; Messrs. W. Ridley & Sons, Reading; Messrs. H. Longley & Sons, West Hoathly, near East Grinstead; Messrs. Mulford Bros., Graywell, Winchfield; Messrs. West & Sons, Little Bowden; Mr. J. Follett, Basingstoke.

SCOTLAND.—On April 16th about 200 lots of larch wood and hag were sold on the estate of Drumtochty, Fordoun. There was a fair attendance. Larch brought from 5s. to £1 per lot, and hag from 1s. to 2s. 6d. The chief buyers of larch were Mr. Hendry, Denmill; Mr. Gray, Pittrenny; and Messrs. Murray & Milne, Auchinblae.

FORESTRY IN AMERICA.

FORESTRY continues to attract much public attention in the United States, and the following interesting remarks are extracted from an able address on the subject, recently delivered before the Agricultural Convention of Ohio, by the Hon. F. B. Hough, of Washington, Chief of the Forestry Division of the Agricultural Department of the United States:—

In considering the subject of Forestry we find it more or less connected with many branches of science. The geologist finds a relation existing between the surface-rock formation, and the trees that grow upon the soil formed from its decomposition. The physical geography of a country, its aspect and elevation, have a marked influence upon the woodland growth. The chemical constituents of the soil and subsoil have their effects not less distinctly shown in their woodlands, and the meteorological and climatic influences of forests, their influence upon the water supply of a country, and their hygienic effect, all present subjects worthy of our study, and promise much as the reward for future research and observation. The subject presents inviting fields of labour in half-a-dozen or more of the natural sciences. In countries where forest administration exists, it implies an extensive acquaintance with the special jurisprudence of the forest code, and with matters relating to its application—and in all countries, but more especially in our own, it presents problems in political economy, in agriculture, and in the industrial arts, that deserve our careful attention.

For the first few years after the New York canals were finished, fully ninety per cent. of the forest products that went to market by this route, were derived from that state. A few years later, and we find the percentage reduced to fifty, then to forty, thirty, twenty, and ten. It is now but five, and must ere long cease altogether. This means that

the Empire state has now scarcely any surplus forest products to spare, and it is well known that in many regions where extensive lumbering operations were carried on, the ample forests have given place to agriculture, or where burned over, have since lain an idle waste.

The Northern, Middle, and Eastern states have been drawing heavily upon Canada and Michigan for their pines, through the last quarter of a century or more, besides the vast quantities that have gone to foreign countries. The native limits of the pine in the lower peninsula of Michigan are being rapidly narrowed down, and at the present increasing rates must inevitably dwindle to a point and disappear altogether, before many years are passed.

For several years past the Dominion Government in Canada has been seeking, through Parliamentary committees, to devise some measures for meeting the situation, with reference to their forests, and their supplies in many regions of former abundance are nearer exhausted than our own.

The state of Maine is known, in common parlance, as "The Pine-tree state," and the figure of a stately pine is borne upon its great seal. Yet this name and device refer to a time already gone, for that state now exports little or none of that timber, and her ship-yards, at Bath and elsewhere, draw their main supplies from our Southern states.

Her lumber ports, including as a part those of the St. John river, in New Brunswick, are now chiefly hemlock and spruce, and the latter is now suffering from a casualty that in a few years, at present rates

of decay, would annihilate it altogether.

The first effect of this rapid and inconsiderate exhaustion must be the unavoidable advancement of prices, as the supplies fall off, and the effect of this, it is to be hoped, must be to impress upon our people a realizing sense of the value in a growing tree.

Is there any rate of investment that grows so fast as this? Let us for a moment consider. If we count the rings of growth on the section of a tree, we find a series, approximately circles, and on the general average, about of equal width, from year to year. A season unusually favourable, or otherwise, may make the growth greater or less in some years than in others, but for the present argument we may call them true circles, of equally increasing breadth. These counted from the middle outward form the series 1, 2, 3, 4, 5, &c., corresponding with the years in the tree's age. The areas of these circles are as the squares of these numbers, or 1, 4, 9, 16, 25, &c., and the gain in growth from year to year is the difference of these squares, or 3, 5, 7, 9, 11, 13, &c., an arithmetical series, having a common difference of 2. I will again ask, what other investment pays such rates as this? In this calculation I have considered only the sectional areas, without reference to increasing height and gain in relative values as a tree becomes older.

Now, turning to examine the tenure of lands in this country, we find that in all of the older states, and in considerable portions of the newer states and territories, the landed property is now vested in

private owners. Their titles are allodial and absolute, and probably without exception, there is no stipulation whatever as to the kinds of cultivation that shall be followed, or the crops that shall be raised. We also know that the American citizen is of all men the most jealous of his rights, and the most impatient under dictation, in the management of what he knows is his own. On questions arising in regard to eminent domain, he may submit to an appraisal and forced sale of the right of way across his farm, where he cannot prevent it, but he would never allow any man, or set of men, to control his cultivation against his will.

What, then, can we do? In my opinion, the work must be one of education. We must lead the owners of the land, by precept and example, to learn the profits to be derived from the planting of trees. We must show them there is money in it, not only from the material actually grown but incidentally to our agricultural and horticultural interests, from the proper distribution and due proportion of groves and belts of woodland, among our grain-fields, our meadows and pastures, and our gardens and orchards. We should be able to demonstrate these benefits by actually showing how much more can be realized from three-fourths of the surface, one-fourth being woodlands, than from the whole with no trees growing.

In some regions, the remaining supplies of native timber are yet of considerable extent and value, and no time should be lost in seeking to reserve these for the greatest benefit,

as well to the present as to a future generation. We are annually wasting, and allowing to perish forest products which if utilized would bring a rich return at a small cost. Perhaps this is nowhere more strongly illustrated than in wood-cutting machinery, where material is saved that would otherwise be lost. The old saw-mills of the country would tear out a quarter of an inch in width every time through, amounting to from 20 to 25 per cent. of all the lumber they sawed, and this often when the quality and price were of the highest grades, while with thin saws and well-adjusted machinery, the loss is not more than an eighth or a twelfth of an inch at every cut.

There has been a great economy introduced in recent years, from using band, concave, and cylindrical saws for special purposes, and by steaming and slicing thin stuff, whereby the waste is reduced to nothing, and further advances in this direction would richly repay the inventor. In boring pump logs, the core may be saved in one solid piece, and sometimes a tube within a tube by using thin cutting borers. Shapes may now be secured by bending where formerly they were got by cutting away, and uses are now found for small parts that formerly went to waste.

There is a saw-mill on the Grand Trunk Railway, between Portland and Montreal, where the slabs and edgings are made into paper pulp. We know that the best of illuminating gas is now made from chips and sawdust, and a child can understand that a saw wastes less than an axe in felling trees and cutting cord-wood.

Permit me to mention an economy in the manufacture of charcoal, which I have witnessed in an adjoining state on my present journey. At an iron furnace, where large quantities of charcoal are required for smelting ores, a chemical company has established works for saving the volatile products from burning of wood into charcoal, and turning them to commercial account. As I was informed by the superintendent two months ago this company paid 20 cents for the smoke of every cord of hardwood used; but since then smoke seems to have risen, for the president of the ironworks informed me two days ago that they now got 31½ cents per cord for the smoke, and a clear saving of from 5,000 dols. to 6,000 dols. a year from its sale. From this smoke they make two gallons of wood alcohol, used in the manufacture of paints and varnishes, and worth 85 cents per gallon in the Chicago market. The acid residue, after this distillation is neutralized with freshly slaked lime, and evaporated to dryness, yielding 200 lbs. of the acetate of lime, used in the manufacture of white lead, and worth in the Philadelphia market 2½ cents per lb.

From a cord of wood, the yield of charcoal is 42 bushels, worth 7 cents per bushel, or 2.99 dols. per cord. The chemical products above mentioned amount to 6.70 dols., besides the combustible gas not condensed, which supplies three-fourths of the fuel used in evaporation, and the tar which is used only as fuel. The latter might be turned to much more profitable account under a more refined chemical treatment than that

in use, but it will be seen from the above statement that the smoke yields more than twice as much profit as charcoal, and it is claimed that the latter is increased both in quantity and quality by the process employed.

Time will not permit me to notice the agency of forests in restoring fertility to worn-out lands, and other benefits that result from their products other than as wood. The methods employed, in drawing turpentine from the pine forests of our Southern states, kills off the trees in a very few years, while by other and improved methods the French make their pineries last fifty years and more without difficulty. In the province of New Brunswick I learned a few months ago that not 1 per cent. of the hemlock trees cut for peeling bark was saved for any other use, and the experience of many sections of our own states is but little better. In short, we have everything to learn about the economies of forestry, and it would be a happy thing to the country if our people could begin early to learn these useful lessons, while considerable supplies still remain.

Recurring again to the question above asked, "What can we do?" I would reply further: That the General Government, which still owns large bodies of woodlands in the interior and on the Pacific Coast, should delay no longer in putting them under an efficient management, with the view of supplying the timber now fully matured, and at its greatest value for the living age, regard being at the same time had for the preservation of the younger growth for the future. It can do a great

deal towards extending our knowledge of the wants and requirements of the country, and the means by which these may be most effectually supplied. We hope to be able to submit in detail many facts before committees of Congress at its present session, that may tend to meet some of these objects.

With reference to the question of State legislation I will conclude by submitting for your consideration a memorial which was adopted by the American Association for the Advancement of Science, at its last session in Boston, in August last, and a copy of which has been addressed to the governor of every state and territory in the Union. With reference to Ohio it gives me great pleasure to learn that the House of Representatives, at its last session, referred the general subject of forestry to a special committee of its members, and from the intelligent appreciation of the subject which I have heard its members express, I feel confident that it will receive due attention; the memorial I refer to will probably be transmitted by the Executive to the Legislature in due time, and should the Board of Agriculture approve, I would trust that it may receive the support of its influence.

TO PROTECT TREES FROM RABBITS.

I HAVE under my charge an extensive wood adjoining the pleasure grounds, &c., which is by degrees being thinned of the existing timber, viz., Oak, and planted with Conifers, Rhododendrons, and a variety of

evergreen and deciduous trees and shrubs, but unfortunately rabbits abound to an alarming extent, and among other things they appear to have set as objects for destruction some nice specimens from six to nine feet high of *Crytomeria japonica*, of which we have several hundreds. This time last year they commenced destroying wholesale by peeling the bark all around the stems, so to put a stop to their depredations without of course killing the depredators, I had to find a preventive. I had used or seen used for the purpose, dead spruce twigs, gorse and straw-bands. The latter, considering the current price of straw, the labour of making bands, as well as their short duration, would have been a serious item in the garden expenses, and the two former were not available without going a distance for them, and even then I should have run the risk of being blamed for disturbing game in the covers, &c., so I decided to try an experiment, and never having known rabbits to eat either the leaves or bark of *Rhododendrons*, and having large clumps of *R. ponticum* overgrowing choicer varieties, I at once commenced to thin and prune them, had the prunings of all thicknesses cut into eighteen-inch lengths, put round the stems of *Cryptomerias*, *Hollies*, &c., and tied rather loosely top and bottom with tarred cord (when doing any more I shall use wire, as being more durable). I had every plant I knew rabbits had a partiality to protected in the same way, and I am happy to say the results are quite equal to my most sanguine expectations, for not a

single plant so treated has been touched. I do not claim credit for this being a new plan, or consider myself the originator of it, but I think if it were more widely known many valuable trees would be saved. May I add a word of caution? Previous to my taking charge here, the forester had been dressing some plants with the usual preparations for preventing rabbits—viz., tar, grease, soot, &c., which proved effective for a short time, but I regret to say it at the same time killed every branch to the height the trunk was dressed, so it is advisable to be careful.

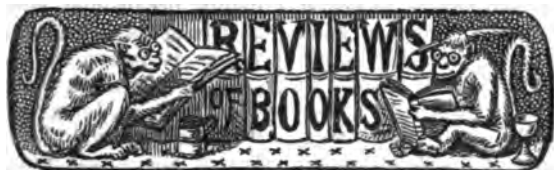
J. ROBERT,
(*Gardeners' Chronicle.*)

CEDRUS DEODARA.

THE specimens of this handsome conifer, growing in suburban gardens, present a very different appearance now to what they did in March last, when the severe winter (or shall we say a succession of severe winters?) had denuded them of their leaves. Healthy specimens of the previous autumn looked as if they would die, and many feared this result would be experienced. Spring and summer have in most cases clothed the plants with a thick foliage of leaves, and the trees appear scarcely to show a single trace of the ordeal through which they passed. In many fore-court gardens the Deodar was planted years ago, when coniferous plants became the fashion. They have been allowed to grow unchecked, darkening the house, and, by reason of the

close proximity to the house, becoming huge misshapen trees. The pruner's knife is needed, but should be used by some one with caution and judgment. Some years ago the late Mr. James MacNab, of Edinburgh, declared it as a remarkable fact that those trees which stood best the severe winter of 1860-61, were those cuttings and seedlings which had been freely pruned at some stage. "The growths of these were numerous and short, and resisted bending with the heavy snow, which was found to be so fatal to those trees where pruning had not been resorted to." The Deodar will stand a great deal of rough treatment from frost and injudicious thinning out. Trees that years ago were severely injured by the winter of 1860, even to the degree of the loss of main branches, have by careful management regained somewhat of their old proportions, without, however, becoming the shapely specimens they were before old Winter tumbled from his northern abode with such unusual strength, and worked so much and such sad mischief in the realm over which for a brief period he holds such despotic sway. A mild but seasonable winter in 1881 would have been welcomed by all gardeners, as the losses during 1878-79 and 1879-80 were of a character to lead them to long for a time of truce, that the shattered forces may be re-organized for conflicts yet to come.—*Gardeners' Chronicle.*





Transactions of the Scottish Arboricultural Society. Vol. IX., Part III. Edinburgh: Douglas & Foulis. 1881.

The excellent address which was delivered at the opening of the twenty-seventh Annual General Meeting of the Society, by Mr. Robert Hutchison, of Carlowie, F.R.S.E., forms the first chapter of this part of the *Plantations*. This is followed by a capital practical paper *On the Various Modes of Enclosing Elevations*, by Andrew Slater, Overseer, Wyreside, Lancaster. Mr. Slater gives useful advice to the beginner in the formation and management of hedges, with carefully-summed up estimates of their cost until they become efficient fences. Examples are also given of the various modes of constructing turf and stone dykes, and ditch and dyke fences; wood, wire, and iron fences. Each description of fence is minutely explained, and clearly illustrated by neatly-designed diagrams; and the estimated cost is added, so that the paper affords a valuable mass of instruction, and to the uninitiated it is worth more than the cost of the whole part. *On the Cause of the Disease observed on Beech Hedges in various parts of Scotland during the past two Seasons*, by Mr. Robert Hutchison, of Carlowie, F.R.S.E., gives an interesting *résumé* of the havoc wrought among beech trees and hedges by a species of *Aphis* in certain districts of the country in recent years. Pointing out the experiments which have proved that the eggs of *Aphides* will retain their vitality even when subjected to a temperature many degrees below zero, Mr. Hutchison says: "The

abundance of *Aphis* affecting the beech during the last two years is thus easily explained; for while the wet summers, and cold autumns and winters, are most inimical to the existence of the lady-bird (*Coccinella Septempunctata*) and other insects, as well as of many birds, whose natural food the *Aphis* family form, these have been suffering severely, and perishing in thousands, during the two last very severe winters and ungenial summers, or have been absent from our shores altogether. Hence the undue increase of this pest, and the consequent destruction of our beech trees and hedges, a destruction which may annually in a far less degree be present, but which the untoward characteristics of the seasons have tended to magnify into a veritable plague and wasting away of many of our finest specimen old hedges and trees." A strong plea is urged in favour of protecting and encouraging the increase of all insect-feeding birds and insects, which are the natural foes of the *Aphides* and other plant pests.

Transactions and Proceedings of the Botanical Society. Vol. XIV.—Part I. Edinburgh: Printed for the Botanical Society, 1881.

This part opens with an address delivered by the retiring President, Dr. F. A. G. Balfour, in which he ably demonstrates the great advantage to the Medical profession of a thorough knowledge of Botany, and points out with great clearness the necessity of Botany forming a branch of the education of the Medical student. These remarks are followed by interesting notices of the lives of the Members of the Society who have died in the course of the year; including such well-

known and eminent men as Sir Walter C. Trevelyan, Bart.; Professor Grisebach, of Göttingen; Dr. Karl Koch, of Berlin; Dr. David Moore, of Dublin, and others distinguished as botanists, arborists, or horticulturists. "On the Growth of the New Zealand Flax Plant (*Phormium tenax*) in the Orkney Islands," by Dr. W. Traill, shows how that and many others of the native plants of New Zealand are well adapted for growing in the Orkneys, where they appear to flourish in a remarkable degree in the average of seasons. The next paper is also devoted to "Notes on New Zealand Plants," that withstood the severe winter of 1878-79, at Rait Lodge, Trinity, near Edinburgh, by the late Mr. William Gorrie, who had devoted great attention to the introduction of new plants, especially from New Zealand, for many years, and possessed at Rait Lodge one of the finest private collections of them in the country. In some "Additional Notes" read before the Society on 8th July, 1880, Mr. Gorrie records considerable injury to most of the plants he had formerly noticed as fairly hardy, and, with few exceptions, it is doubtful if many New Zealand plants in this country have come through the last winter (1880-1) unscathed, except in the most favoured spots. Papers of great botanical interest are contributed by Professor George Lawson, Dalhousie College, Halifax, "On the British American Species of the Genus *Viola*;" by Mr. Symington Grieve, "On the Flora of Colonsay and Oransay," two of the lesser Hebrides, Argyllshire; by Mr. James Blaikie, M.A., F.R.S.E., on a botanical "Tour in the Engadine," Switzerland; by George M. Thomson, on "The Flowering Plants of New Zealand, and their relation to the Insect Fauna"; by J. H. Balfour, M.D., F.R.L.S., L. and E., Emeritus Professor of Botany, Edinburgh, on a specimen of *Rheum Nobile*, a

highly ornamental species of rhubarb from the Himalayan mountains, where it forms one of the most striking plants in the Sikkim territory; by Mr. John Sadler, Curator, "On the Flowering of *Yucca Gloriosa*, L., in the Royal Botanic Garden, Edinburgh;" where numerous plants of it flowered profusely in the autumn of 1879; and by Professor Dickson, M.D., "On the Septa across the Ducts in *Bougainvillea Glabra* and *Testudinaria elephantipes*." Two beautiful plates of illustration accompany Dr. Balfour's paper on the *Rheum Nobile*, and Mr. Sadler's on *Yucca Gloriosa*; the latter giving a charming view of the effect of the Yuccas when in flower, in October, 1879, on the Rock Garden at Edinburgh. It is, however, the valuable paper on "The Influence of the unfavourable Season of 1879 on the Growth of Trees," by Sir Robert Christison, Bart., that will most deeply interest arboriculturists. In connection with his well-known investigations regarding the "Exact Measurements of Trees," that eminent arborist has been devoting attention to the annual increment of a number of species of trees. The paper before us treats chiefly on the growth made by various kinds of forest trees during the inclement season of 1879. Of 15 species of deciduous trees which had been carefully measured, "the sum of their growth in girth of trunk was in 1878, a decidedly favourable year, 11·30 inches,—in 1879, 8·15 inches. This is equivalent to a reduction of 28 per cent., or a little over a fourth in 1879." Then of seventeen evergreen coniferous trees, "the sum of their increase in trunk-girth was 15·7 inches in 1878, and 12·5 inches in 1879,—a diminution in the latter year equivalent to exactly 20 per cent., or one-fifth." It thus appears that evergreens suffer less from cold and wet than deciduous trees, and among the latter the various species of oaks seem to

suffer least from the inclemency of the weather. Looking for the causes of this marked diminution in the growth of trees in the season 1879, Sir Robert attributes it, in the first place, to the cold ungenial nature of the spring of that year, which retarded growth so much that tree buds generally did not begin to fairly unfold till the beginning of June; thus depriving them of fully a fifth part of their usual season for growing. Then the temperature of the growing months in 1879 was greatly below the average, and the notable deficiency of sunshine, which accompanied the unusually low temperature, all tended to contract the growth and wood-forming capacity of trees. The paper contains a valuable table of the growths made by some forty-four trees in the years 1878 and 1879, including birch, beech, lime, sycamore, tulip-tree, horse chestnut, sweet chestnut, oak, hornbeam, Douglas fir, Deodar, Atlas cedar, Arancaria, yew, Scots fir, Corsican pine and others, from which Sir Robert has drawn the interesting facts detailed in the paper. It is a subject having a wide bearing on the success or non-success of certain trees in localities which suffer from an ungenial climate, and much useful information may be derived by the ardent arboriculturist by a careful study of the matter through a continued series of years.

The Pinetum. By George Gordon, A.L.S. New edition by Henry J. Bohn, F.L.S., &c. London: Henry J. Bohn, and Simpkin, Marshall and Co.

In the present edition of Gordon's *PINETUM* the reader will find many interesting additions to the original work, which has long been a well-known book to all the numerous admirers of the Coniferous tribe. The whole work has been thoroughly revised and corrected since it first appeared, and is now well up to the wants of the day, and the knowledge

we possess of the extensive order of trees upon which it treats. A short introduction gives a summary view of the wide range of habitat of the various branches of the tribe, and their predominating extent in the temperate and sub-arctic zones, as well as touching upon the soil preferred by them to grow in, and the host of useful purposes to which their products are so abundantly applied. A concise reference is then made to characteristic points by which the natural order *Pinacea* is generally divided into families and sections; and then follows full details of each genus and species of Conifer, and also of many of the numerous varieties which appear among them, and are sufficiently distinct and interesting as to make them worthy of having their peculiarities described.

Referring to the term *Abies*, by which the Spruce Firs are best known in this country, it is said that the ancients called the Silver Fir "*Abies*," and the Spruce Fir "*Picea*," but by some inadvertence *Linnaeus* reversed the names, and thus created great confusion in their nomenclature. The English and American writers still follow *Linnaeus*, and apply the name *Abies* to the Spruces, and *Picea* to the Silver Firs, while nearly all the French, German, and other continental authors follow *Bauhin* and *Du Roi*, and reverse the terms, applying *Picea* to the Spruces and *Abies* to the Silver Firs. Pliny called *Abies excelsa* "*Picea*," and distinguished it from the Silver Fir, as the "*tonsili facilitate*," on account of its fitness to be shorn or clipped into hedges; and Professor Link observes that the true Spruces (*Abies*) approach nearest to that *Pinus*; and that upon close inspection still more so than at a first glance. He says: "For instance, if the leaves that stand singly are examined minutely, it will be seen that several of them have their surface grown together, and consequently they are in tufts, like the leaves of the true Pines;

and as a proof that this is the case, it will be found that there is no upper surface on the leaves of the Spruces, but that the leaves present only the under surface on both sides, as will be seen on comparing them with the leaves of the true pines. The seam where the leaves are joined may be distinctly seen, for it forms a line in relief on both sides of the leaves of the common Spruce, which is never the case when such line is formed by the mid-rib, because it is then either on the upper or under side. Some spruces have two leaves grown together, others four; the sheaths at the base of the leaves are not observable, but appear to have grown together at the foot-stalk." In addition, Professor Link points out the following difference between the leaves of the true Spruces (*Abies*) and Silver Firs (*Picea*). "The leaves of the Silver Fir," he says, "do not grow together, but are single, and have the usual form of single leaves, the mid-rib being only visible on the underside; the upper one, having a furrow down the centre of the leaf, is flat, is divided at the point, and dark green, with two white stripes on the under side, one on each side of the mid-rib and arranged in two or more rows along the shoots in a more or less lateral position."

An "Addenda" of about a dozen pages contains some interesting particulars concerning a number of varieties of Conifers, which ought to have been incorporated in their proper place in this edition of the book. An excellent systematic index gives the name of every genera, species, and variety of Conifer described in the work; and also a copious list of the far too numerous synonyms by which many species of Conifers are known to us. A special feature in this edition is the introduction by Mr. Bohn of a useful list of references to the coloured plates given in the three great,

and now scarce and expensive, English works devoted to the illustration of Coniferae;—namely, Lawson's *Pinetum Britannicum*, Lambert's *Genus Pinus*, and the *Pinetum Woburnense*. Mr. Bohn has also compiled an excellent list, extending to nearly thirty pages, of the Popular Names of Coniferous trees in the different countries of the world, which forms one of the most interesting portions of the work. We are pleased to note many excellent improvements in this useful book which should find a place in the library of every one interested in the study and culture of Coniferous plants.

The Florist and Pomologist.—The April number of this serial contains two beautifully-coloured plates—one representing some fine new varieties of those hardy spring-flowering plants, Hellebores, which have bloomed in Mr. Barr's collection, and which he calls Lenten roses; the other one portrays some very luscious plums, known as River's Grand Duke. Amongst other flowers and fruits treated of are cherries, Russian apples, roses, fuchsias, and violets. There is also an interesting article on those charming ornamental trees, Weeping Birches.

The Rearing and Management of Hardwood Plantations, by Mr. DAVID TAIT, Wood Manager, Owston Park, Doncaster, treats of the management of these plantations chiefly from a pecuniary point of view, so that they may form a regular source of revenue to the enterprising proprietor. A short description of our common hardwood trees is given, from which it appears that the most profitable of these trees to plant are, ash, birch, black Italian poplar, Scotch elm, and sycamore; followed by oak, English elm, beech, Spanish chestnut, lime, alder, and willow, somewhat in the order in which they are named. An able and instructive paper *On the Deterioration of the*

Larch, by Mr. John McGregor, Ladywell, Dunkeld, will be read with great interest by all those whose plantations have suffered from the attacks of the larch *aphis* or larch bug (*Adelges laricis*), and which is affirmed to be the cause of the "blister" in the larch; a disease only too common in many parts of the country, and which has ruined many a thriving larch plantation. In this excellent paper the inquirer will find almost all that is known on this subject at the present time. The next paper, *On the Bearing and Management of Hardwood Plantations*, by Mr Thomas Wilkie, Forester, Ardkinglas, Inverary, contains some useful hints on this important subject, and is a continuation of a short paper which appeared in the previous part of the *Transactions*. A paragraph of ridiculous nonsense, on "Ornamental Forestry," is tacked on to the paper, which appears like editorial napping to allow such absurdities to be promulgated under the auspices of the Society. *Ne eutor ultra crepidam*—let not the shoemaker go beyond his last—is a motto which should be constantly remembered by prize essay writers.

That all-absorbing subject, *The Larch Bug*, forms the text of an excellent practical paper by Mr. William Harrower, Forester, Cahir, Tipperary, who appears to have taken considerable trouble to understand the matter, and gives a clear summary of the life history of the insect which commits such dreadful ravages among larch plantations. Treating of remedies for the attack of the "bug," he says: "The most reliable wash is diluted Paris green, applied several times during the summer to all infested plants;" the wash to be applied in the proportion of one pound of Paris green to five gallons of water, more or less, as the season may be wet or dry. In a dry season it is most effective; in a wet one the wash should be stronger. Ascribing to the nursery the origin

of the pest which infests our woods and forests, he suggests that the "Society should inaugurate a system whereby nurserymen, and those rearing seedlings, would exert themselves to keep their ground clear of the insect. Until we have some method of preventing the pest from being carried to the woods on young plants, I fear we must look upon the disappearance of the insect as one of the things that is not to be," a—remark which deserves the careful attention of all interested in the cultivation of the larch. The next paper gives a valuable and interesting account of the *Cultivation of the Cinchona Trees* in India, by Mr. John Ferguson, Deputy Conservator of Forests, Nelambur, South India. The cultivation of Cinchona, for the production of Peruvian bark and quinine, is a recently-introduced industry in India, and appears to be highly remunerative when conducted on proper principles. An acre of *Cinchona Succirubra*, eleven years old, is said to yield 4,572 pounds of dry bark, realising in the market at 4s. 6d. per pound, £1,028, or about £93 per acre for each year. The various methods of cultivation and management of a plantation are well described by Mr. Ferguson, and those who contemplate engaging in that branch of industry would do well to make themselves master of this paper.

A short paper, *On the System of Oak Coppice Management Recently Adopted*, by Mr. Thomas Wilkie, details a well-known method of converting coppice into high forest. This description of oak forest is calculated to be more remunerative than coppice in these days of low-priced bark and costly labour. The concluding chapter gives a summary, as regards *Forest Conservancy*, of the remedial measures proposed by the Indian Famine Commission. The conclusions arrived at in respect to the influence of forests on climate, are what have been familiar for many

years to those who have investigated the matter. The following extract will show their general tenor: "So far as any immediate advantage is to be sought from the extension of forest in respect to protection against drought, it will, in our opinion, be mainly in the direction of the judicious enclosure and protection of tracts from which improved and more certain pasture may be secured for the cattle of the vicinity, a supply of firewood secured, which may lead to a more general utilisation of animal manure for agriculture, and a possible addition made to the power of the subsoil to retain its moisture, and to the prospect of maintaining the supply of water in the wells. As to the protection of the higher slopes from denudation, it may be confidently stated that they will, in any case, be more useful if kept clothed with wood than subjected to the wasteful and destructive process by which they are brought under partial and temporary cultivation; and that, whether the expectation of an improved water supply as a consequence of such protection is fully realized or not, there is on other grounds sufficient reason for arranging for the conservation of such tracts where it is practicable."

In several Appendices are given lists of the Presidents of the Society from its origin in 1854 to the present time; of the members and office-bearers for the year 1880-81; of the prizes offered for competition during the current year; and of the publications received by the Society during the past season. An abstract of the accounts for the year 1879-80 concludes the part, and gives a favourable report of the finances of this flourishing Society. It ought to be mentioned that a copy of the striking portrait of Mr. William McCorquodale, of Scone, which appeared in this *Journal* for November last, is presented with this part to every member of the Society.

OUR FOREIGN EXCHANGES.

IN the Spanish *Revista de Montes*, No. 100, is a valuable article by Don Juan Jose Muños on the conditions necessary to the successful prosecution of reboisement, or the replanting of denuded forest-lands. There also appears from the pen of Don Alvarez Sereix a lengthened notice of the *Journal of Forestry* in terms of commendation, with the reproduction in Spanish of an important excerpt, and a commendatory notice of Mr. Mackenzie's proposal to have a School of Forestry in connection with Epping Forest, a reference to the papers which had previously appeared in the *Journal of Forestry* on this subject, and the expression of a hope that Great Britain may not much longer present the sad spectacle of being the only country in Europe in which there exists no public provision for the study of forest science.

There is also expressed cordial approval of the treatise of Hon. F. B. Hough, head of the Forest Section of the Department of Agriculture in the United States "*On the Importance of giving Timely Attention to the Growth of Woodlands for the Supply of Charcoal for Metallurgic Uses*," and in No. 101, a paper by Don Aurelio Diaz Roca full, on the replanting of the forests of the Asturias.

In the *Revue des Eaux et Forêts* appears the first of a series of papers on the Forest Law of Hungary; and a paper on the Forest Question in Roumania; a report of reboisement in the Department of the Var; and a proposed theorem determining the cubic increase of wood in a forest.

In *L'Echo Forestier* is a paper on Cooperage, and the variety of designations given to casks in the trade, and in the broad trade.

In the Russian *Zeitung* of St. Petersburg, appeared lengthened details in regard to the spread of the Phylloxera, and of remedial measures adopted or proposed. J. BROWN.

THE JOURNAL OF

FORESTRY & ESTATE MANAGEMENT.

THE AGRICULTURAL DEPRESSION AND HOW TO MEET IT: HINTS FOR LANDLORDS AND TENANT FARMERS.

THE lengthened period of agricultural depression from which we are still suffering, and which is unparalleled in the history of the country, points to the necessity for remedial measures such as shall not only enable farmers to tide over seasons of losses which have come thickly upon them, but also prevent—as far as human foresight can effect this—a recurrence of the evils under which we are at present groaning.

A succession of wet and sunless summers has resulted in diminished crops of cereals, at the same time that the quantity obtained has been very inferior in quality, while the abundance of foreign importations has kept the price of corn below what under ordinary circumstances can be considered as fairly remunerative to the English grower. The heavy losses sustained by flockmasters from the ravages of the rot amongst sheep, combined with the low prices of wool, have tended still further to complicate the difficulties of the farmer. And to crown his misfortunes, even in counties like Kent, where a good hop-crop or an abundant crop of fruit goes a long way towards retrieving the losses occasioned by other failing crops, the former has suffered severely from the mould, and the latter has for some years been unremunerative.

One result of the unfavourable seasons is that much of the heavy land became so foul that two or three years will be required to bring it back into a state of good and clean tilth, the past dry spring enabling this to be done only upon fallow lands. Upon such soils the pastures have also greatly deteriorated from the continued wet weather, many of the finer grasses having become enfeebled or entirely died out.

To meet the times landlords have in many instances given liberal discounts to their tenants; and though these have in but few cases been such as to meet the heavy losses sustained by the latter, and the amounts may have appeared small to the recipients, the sum of such

deductions has upon many large estates been sufficient to reduce very materially the income of the landowner. In all cases these discounts were very acceptable to the tenants, and in some they were absolutely indispensable to the continuance of the working of the farm. But at the same time it is worthy of consideration whether the same amount of money spent upon the farms in effecting improvements upon which no interest should be charged to the tenants, would not in the end have conferred an equal benefit upon those tenants, and have proved a lasting advantage to both owners and occupiers. Among such necessary improvements may be mentioned drainage, grubbing hedge-rows and felling hedge-row timber, the erection of good cattle-feeding sheds, covered yards for sheltering beasts and manure making, liquid-manure tanks, and works of irrigation, where such are practicable. Each one of these would be a permanent benefit to the tenant, and the advantages to be derived from them in combination would be such as to enable him to meet a few bad seasons with a certainty of diminished losses.

Again, the removal of all unnecessary restrictions with regard to cropping and the sale of farm produce would be one of the greatest boons to the honest, experienced, and enterprising tenant. I say *unnecessary*, because no one of large experience in the management of estates and letting of farms will assert that for the proper protection of the landlord's interests some restrictions are not necessary. But the sum of these is small; and in every case where a tenant is cultivating his farm a little in advance of his neighbours, and in a manner which conduces to his own profit and is consistent with the interests of his landlord, considerable latitude should be allowed.

The interests of the tenant also require that he should have proper security for the capital he may invest in improvements from which his term of occupancy will not enable him to derive the full benefit. This may to a great extent be met by a long lease; but a more satisfactory arrangement might result from a fair and equitable Tenant-Right Bill, or from a more comprehensive Agricultural Holdings Act. The valuation of improvements at the end of a long lease cannot often be depended on for recouping the liberal tenant. And the comparative letting values of any farm at the beginning and end of a lease are affected by other circumstances besides methods of cultivation. Take, for instance, the case of a short lease run out at Michaelmas, 1880. Would many farms now command more than two-thirds of the rent freely bid for them in 1873?

All persons who are familiar with the consideration shown by landowners to the descendants and representatives of old tenants upon their estates, will regret any change which tends to sever ties of friendship and to break old connections which have worked more

lasting good to the tenant than any special legislation. Judge Longfield, of the Encumbered Estates (Irish) Court, says, with regard to the land sold in that court,—“The new landlords were more active and effected more improvements in the land than their encumbered predecessors; but they were less indulgent to their tenants; old traditions of liberality were disregarded, and the new landlords were more disposed to exact the full value of the land.” And again—“The complaint of high rents has been made without ceasing for more than three hundred years. There was never less ground for it than at the present day, although in some instances the rent demanded is still too high; but this chiefly occurs where the landlords are middlemen, or where the property is very small.” And Mr. De Moleyns, one of Her Majesty’s counsel in Ireland, writes—“The smaller investors in land, purchasers usually in the Landed Estates Court, most rigorously enforce the covenant for the payment of a scrupulously adjusted rent.”

The burdens upon the land undoubtedly require a very considerable and careful readjustment; and a step in the right direction will be taken when the collection of the corn returns for the purpose of taking the tithe averages is extended over a greater area and carried out with greater fairness. The extraordinary tithes upon hops and fruits are found to press very heavily in seasons of almost total failures of these crops. Their gradual extinction by some method which would not operate unjustly or press too heavily upon the recipients, who are in many cases but poorly paid, would be a great boon to the farmer.

The proposition that the ordinary tithe be in every case paid by the landlord, who upon letting a farm might add this amount to the rent, appears a reasonable one. But after all, when we look closely into the matter, shall we not arrive at the conclusion that the tenant farmer who has been for many years upon the land, and has reaped the full benefit of the high prices of corn during the preceding seven years, is the proper person to pay the increased tithe? Mr. Chamberlain’s reply to the deputation from the Essex Chamber, to whom he lately gave an audience upon this important tithe question, was to the effect that, “If there had been no Tithe Commutation Act, the tithe would have been much higher than at present, in consequence of the great increase in the productions.” This shows that at least there are two sides to the tithe question.

But the liability to pay extraordinary tithes hinders the profitable cultivation of vegetables and fruits upon much of the poorer soil in the neighbourhood of London, which might otherwise be profitably worked as market gardens. Looked at even in the most favourable light it is a direct tax upon industry and enterprise. And the

English producer, who has to pay this, goes into a market where he encounters foreign competition, while he himself is heavily handicapped.

Much has of late years been said and written upon the subject of advanced rents; and instances might be adduced in which revaluation has pushed these beyond the point at which the tenant can obtain a fair living off the farm. But in the majority of cases, what but the former keen competition for farms enabled the landlord or his agent to obtain these high rents? When it is considered that, apart from periods of unusual depression like the present, the profession of Agriculture is looked upon as one of the most healthy and delightful of occupations as well as one of the most honourable, it is not difficult to perceive that the competition which it creates must very materially diminish its profits. Its former attractions were sufficient to bring into the field a very large number of applicants for every vacant farm of any pretensions. And only a few years ago, in the halcyon days of farming, dozens and even scores of candidates appeared as soon as it became known that a good farm was to let. Under such circumstances, does any one blame the landlord for accepting the highest bidder, if at the same time he had reasons for believing that he was a good farmer and solvent?

It is but a very few years since farming pursuits enabled those who followed them to live in ease and comfort, if not to enjoy the luxuries of life; and the freedom and comparative ease of a farmer's life, combined with its healthiness and independence, were sufficient attractions to allure the prosperous or the retired tradesman, who looked upon agriculture, not so much as a means of obtaining a livelihood, as an opportunity of enjoying the much-envied country life and country pursuits. These attractions often induced him to outbid the farmer who was "to the manner born," and who had no other means of subsistence. The introduction of such a class of tenants was the means of raising the rents of agricultural lands, more especially within reach of the towns, and at the same time of saddling farming with an expenditure which it could not meet except during the most prosperous times.

It will not be denied that many a small farmer of the present day enjoys comforts and lives at a rate of expenditure quite unknown to the substantial yeoman of thirty or forty years ago. This is no doubt partly due to the progress of the times; but it is worthy of consideration whether, with the additional burdens now saddled upon the ratepayer and the employer of rural labour, farming will ever again sustain the late extravagant outlay. It may be, and undoubtedly it is the case, that during the more prosperous period sufficient care was not taken to provide for a reversal which

was certain to come sooner or later. But there are numberless instances among the farming class in which the deficiencies of late years have swallowed up the redundancies of former ones as completely as in the dream of the Egyptian monarch the lean kine devoured the fat ones.

The class of farmer who of late years has suffered most has been neither the man of large means and superior intelligence, who had brought his land into high condition by means of drainage, deep cultivation, and a liberal application of manures adapted to the soil, and who had availed himself in every possible way of labour-saving machinery of the most approved kind; nor the small tenant farmer, whose labour was mainly performed by himself and members of his own family; but the heaviest losses have fallen upon what may not inaptly be called the middle-class farmer, who in many instances has taken in hand much more land than his capital enabled him to work thoroughly or to stock sufficiently, and whose labour-bill has remained heavy, while his returns have been very materially diminished. The want of capital, and of adequate labour upon the farm, has prevented such a one from obtaining that increased production which is the secret of cheap production, and which alone in times of low prices can enable him to hold his own. The advantages which extra capital on the one hand, or increased personal exertions on the other, secured for the wealthier farmer and the smaller occupier, have not been attainable by the middle-class farmer, who in consequence of this has in numerous instances gone to the wall.

A significant fact, and one useful in its bearings upon the present question, is this—that at this moment very few small farms remain upon the hands of the landowners, and many of these have lately been let at an increased rental; while many large arable farms are unlettable even at considerably reduced rents. This of course is to some extent to be accounted for by the reduced means of tenant farmers, many of whom are unable to continue in their present holdings; but it is also partly to be attributed to the conviction that a smaller tract of land, well stocked and well cultivated, with increased yield and reduced labour bills, is one of the surest ways of being able to withstand the pressure of the times.

(To be continued.)

B.

FORESTRY IN THE UNITED STATES.

PERHAPS a few words on forestry and its needs on the great prairies of the United States may be of interest to the readers of a *Journal* which speaks of the forestry of the world. The great slope stretching from the Rocky Mountains eastward without trees

except along the streams, open to the sweeping winds and storms of winter, is a field for early and practical forestry. In winter, with the exception of the great trans-continental line, the railways are closed, with the air full of driving snow, seeking a lodgment in every cut, only to be removed at a great expense by monster snow ploughs. How to avoid this is the question, and the answer is, plant belts of timber. Wherever this has been done a sure protection has been afforded. The varieties mentioned below are familiar to most of the foresters of Europe, and may be of interest.

The settler on the treeless plains inquires first for trees of a quick growth, and these are found among the soft woods, which are the vanguard, and under their shelter may be started the more valuable hardwoods. For this we must first turn to the different varieties of poplars, of which the *Populus monilifera*, the cotton-wood, is most prominent and easily obtained. This tree along the banks of the streams attains a size of 3 to 4 ft. in diameter; and Michaux speaks of it as furnishing most of the steamboat fuel along the Western rivers. The downy seeds are sown on the moist sand-bars, from which at that season the waters of the spring floods have just receded. In consequence millions of young plants spring up, and make a growth of 10 in. before fall, when they are pulled by millions, and planted on the lands of new settlers a hundred miles westward of these nurseries supplied by nature. Planters often use cuttings from which the writer has seen a growth of 8 ft. in a single year, and the young tree an inch in diameter.

Within a few miles from where I am writing there is a fine plantation of these trees, nine years old, which the owner values to-day at from $1\frac{1}{2}$ to 2 dollars per tree. Ten acres planted with 2,700 trees, and gradually thinned, leaving 1,200 trees per acre, at the end of ten years would be worth, at one dollar per tree, 12,000 dollars. So much for profit, saying nothing about the benefits received by protection of crops, orchards, and animals.

A few days since I received a section of cotton-wood 9 inches in diameter, taken from a tree eight years old, and cut one foot above the ground.

The Abele (*Populus alba*), so well known in Europe, has proved a success in this region, and at the age of fifteen years attains a size of two feet in diameter, making good boards, and of much use for bowls, trays, &c. It is easily propagated by cuttings, endures our coldest winters, and when planted closely it runs up tall and straight, and the poles cut out in thinning when peeled and dried are quite durable.

The Lombardy poplar is another very fast-growing tree, but not long-lived in the West. Some planters have suggested that its decay

is caused by a continued propagation by cuttings, as no seed is produced here, and call for a new importation.

The white willow (*Salix alba*) is the most prominent for screens and combines both a wind-break and hedge. Cuttings a foot long set a foot apart, in two years will be a protection from the drifting snow, and at four years, by plashing and interweaving, a complete barrier from stock. As a single tree for plantations it is a success, and well known in Great Britain.

The near future of the scarcity of pine makes it necessary to plant more of our soft woods.

At a recent lumbermen's meeting in Chicago, it was stated that twenty years would exhaust all the pine forests east of the Rocky Mountains.

Omaha, Nebraska, U.S.A.

J. T. ALLAN.

PRICES OF FOREST PRODUCE AND COST OF WORK.

(Continued from page 15.)

BANFFSHIRE.—The prices of wood in Banffshire, like most other counties, differ in different localities. The wood preferred for fish smoking differs to some extent, according to the market to which it is sent. In London and Edinburgh oak-dried fish are preferred, which are of light yellow colour, and in Glasgow beech-dried fish are preferred, which are darker coloured; and as the former realize higher prices than the latter, 12s. per ton is readily given for the wood (oak and beech), while 10s., and as low as 8s. per ton is given for birch, alder, willow, ash, &c. Burnwood, therefore, is a product, of forestry of considerable importance. Boat-building requires not only as much but a different and more valuable class of wood, such as oak, which realizes from 1s. 8d. to 2s. 6d. per cubic foot; elm, 1s. 6d. to 2s. 6d.; ash, 1s. to 2s. 6d.; larch, 1s. 3d. to 1s. 6d.; Scots pine, 9d. to 1s. Norway spruce and silver fir, 8d. to 1s.; clean beech, suitable for keels, 1s. to 1s. 3d. per foot. There is also a good demand for basket willow at prices from 6d. to 1s. per stone, but as the fishermen, who use them for making fish creels, have from time immemorial been in the habit of collecting willow wherever they could find it, or, as a substitute, briar, bramble, &c., without paying for it, it is a matter of some difficulty to induce them to pay a fair market price.

In addition to the consumption of wood for boat-building and fish-curing, there is another source of equal importance, namely, stave-wood for making barrels. This is of two kinds, each suitable for certain purposes, as Scots pine staves for dry fish barrels; and larch, birch, willow, and poplar for fish in the brine. The former (Scots

pine) does not contain the brine, which oozes through the wood—even the best quality of pine is insufficient to retain it; and home-grown birch is scarcely ever used, not that the wood is inferior in point of quality, as it is admittedly superior to foreign, but it is not sufficiently clean and well-grown to stand the drying and working, and still less so to season properly, as it twists and bends to such a degree, even after being made into barrels, that it is for the purpose of retaining brine, quite useless. Willow and poplar (especially the latter) are used and found as good as that from Norway, but are not of sufficient quantity. Alder is objected to for the same reason as the birch. Larch of all other descriptions is greatest in demand, and best thought of for barrel staves. It not only retains the brine as well as birch, or the other sorts above named, but is much more substantial and durable than any of the others.

As most of the herrings are exported, and therefore subject to much rough handling, barrels of a strong, substantial, and durable description are required, and for this no wood is found possessed of so many good qualities as the larch. Some years ago it was feared that the odour of the wood might impart a disagreeable taste to the fish, and such fears were given expression to by the Board of Trade prohibiting larch barrels being used, but now that such fears have been completely dispelled, no wood is in such request for the purpose, and prices have accordingly gone up within the last five years about 10 per cent.

As the prices vary so much on account of carriage, it makes quotations difficult, but from the following the reader must draw his own inferences. The staves, it may be observed, are $\frac{3}{4}$ in. thick, and the heading or ends of the barrels are $\frac{1}{2}$ in. thick. Birch staves, which also include willow, alder, and poplar, are imported from Norway and Sweden, and are delivered at the ports along the coast at from 63s. to 66s. per thousand superficial feet; at the present time the latter is the delivery price for cash. Scots-pine staves cost, delivered along the same district, from 34s. to 40s. per thousand feet; the former is the price at the saw-mills at Elgin, Rothiemay, and other places near the coast, and the latter what is paid for them delivered in the towns of Buckie, Cullen, and intervening villages; while at Portsoy on the one side and Garmouth on the other, where the cartage costs less, they are correspondingly cheaper. Larch staves cost at Rothiemay saw-mills, 76s. per thousand feet; and delivered at Cullen, Buckie, &c., 80s. The same class of staves five years ago were nearly 10s. per thousand cheaper. The heading before referred to, which is thicker, is .5s. per thousand feet dearer than common staves when purchased separately, but the prices quoted include the usual porportion of heading at same price.

ABERDEENSHIRE.—The prices of wood vary as much in Aberdeen-

shire as in any county of Scotland. Along the coast they are very nearly the same as in Banffshire, while inland they vary in proportion to the distance from railway station or local market. At all the fishing towns and villages there is great demand for burnwood, for colouring the fish, and for this purpose all sorts of wood are used, though, as already said, preference is given to oak, and next to it beech, which realize, delivered, about 15s., and sometimes as high as 20s. per ton. Sawdust is also used along with the wood, and is, indeed, essential to produce the proper smoke, and from 2s. 6d. to 5s. per load is paid for it; that is, for common pine and fir dust, but as high as 10s. per ton is paid for oak sawdust at the sawmills, while other descriptions of hardwood sawdust vary between the former and latter prices.

In Aberdeen most of the wood is bought on commission, and sold by public auction, consequently the prices vary according to demand and supply. Most of the timber, however, is foreign, and sold in various forms, in some cases by the cubic foot, in other cases by calliper measure, and also by superficial and lineal measure.

Upon the price of foreign wood depends, in a great measure, that of home growth, and, indeed, but for the importation of the former the latter would be not only at a ransom, but very soon entirely exhausted. The principal supplies of home-grown timber of the pine tribe has hitherto been from Strathspey and Deeside forests, the former of which has been referred to, and now a few words about the latter. About one-tenth of the land in Aberdeenshire is under wood, the principal part of which is on Deeside, and some of it very fine and of large dimensions, fit, indeed, for masts for the largest vessels. Previous to the opening of the Deeside railway to Ballater the Scotch pine timber of Invercauld realized only 5d. per foot for the very best quality, but has subsequently sold at from 7d. to 7½d. per foot; and as about 2,000 tons of wood are cut annually, the increased revenue to the property, and the sum realized by the railway company must be of no small consideration. The rise in price is computed at about 2d. per foot over all classes of wood, or about 40 per cent., and when taken in connection with the fact that Mr. Farquharson or his ancestors planted so extensively—to the extent, it is said, of “sixteen millions of Scotch pine, and two millions of larch,” the advantages of the railway to the estate must, not only now, but for many future years, be immense. The principal descriptions of wood grown in Braemar forest and Deeside generally are Scots pine, partly natural and partly planted; larch, Norway spruce, birch, alder, and a small quantity of oak and other hardwoods. The oak, however, is of little value, save for the bark. Some of the larch is of large size, and of very superior quality, while in the spruce there is a strong tendency to

heart-rot. The birch varies in quality and description according to the situation and soil where grown. Indeed, no tree requires more judicious treatment than birch, without which there is no prospect of it competing with that grown in Sweden and Norway.

The following are the rates at which the different descriptions of wood were sold before and also since the opening of the railway, and to this must be added the facilities afforded by the traction engine, which is of very great service, and effects a very considerable saving upon the expense incurred between the forest and the railway station :

PRICES BEFORE OPENING OF RAILWAY.				PRICES AFTER OPENING OF RAILWAY.			
	s.	d.			s.	d.	
Scots Pine, 5d. per foot ...	12	0	per ton.	7d. per foot ...	16	9	per ton.
Larch „ 7d. „ ...	17	2	„	15d. „ ...	24	0	„
Birch „ 3½d. „ ...	5	0	„	5d. „ ...	7	0	„
Alder „ 3½d. „ ...	5	0	„	5d. „ ...	7	0	„

PERTHSHIRE.—Next in importance to the celebrated Scotch pine forests of Strathspey and Deeside, are the Duke of Athole's immense larch forests in Perthshire, extending with some interruption from Dunkeld to Blair-Athole, a distance of about twenty miles. As the Dunkeld larch is among the oldest and the best in Scotland, it has uniformly commanded special attention and correspondingly high prices, which, however, as iron has by degrees superseded timber in shipbuilding, for which the Dunkeld larch was chiefly used, the price has correspondingly declined, till of late years it has come down to the standard price of larch on other estates generally. Nor has the opening of the Highland Railway in any way improved the price. It is, indeed, with the larch at Dunkeld as with the oak at Darnaway, the demand in both cases being principally local, and, therefore, when the local trade became depressed and deranged, the prices fell to the level of the general market. While the prices, however, remained unimproved at Dunkeld, it was otherwise at Blair-Athole, for no sooner had the making of the line commenced than the price of larch rose, and by the time traffic was fully established between the North and South, it had risen above 30 per cent. ; and now the prices at Blair-Athole and Dunkeld are about equal, as follows :—Larch, from 1s. to 1s. 3d. per cubic ft. ; Scots pine, 8d. to 9d. ; spruce, 7d. to 8d. ; ash, 1s. 6d. to 2s. ; oak, 1s. 6d. to 1s. 9d. ; elm, 1s. 6d. to 2s. , birch, per ton, 10s. to 12s.

EDINBURGH.—The prices of wood in the county of Edinburgh, like other counties, vary according to situation, demand, and various other circumstances. And, without going into minute details, the prices realized at an auction sale, at Hopetoun House, in April, 1870, were as follows, and apply to the best quality of the different descriptions of wood :—

		s.	d.	s.	d.	
Oak	from	2	0	to	2	6 per cubic foot.
Elm	"	1	9	"	2	0 "
Beech	"	1	0	"	1	2 "
Birch	"	1	0	"	1	2 "
Alder ..	"	1	0	"	1	2 "
Ash	"	1	6	"	2	0 "
Sycamore	"	1	6	"	2	0 "
Lime tree	"	1	0	"	1	2 "
Sweet chestnut	"	1	3	"	1	6 "
Scots pine	"	0	10	"	1	0 "
Spruce	"	0	8	"	0	10 "
Larch	"	1	0	"	1	6 "

Small wood, usually termed burnwood, but which in this district is used for chemical purposes, such as the manufacture of vinegar and charcoal for powder, realized about 12s. per ton.

With the exception of the elm, which has advanced in price about 3d. per cubic ft., and sycamore, which has declined about 6d. per ft. there is no important alteration of prices; and even the variations above indicated are not to be relied on, as the presence or absence of Liverpool or Manchester purchasers of sycamore for musical instrument making is sufficient to make all the difference.

The following are the prices at which manufactured wood is sold at saw-mills in the neighbourhood and district around Edinburgh:—

	s.	d.	
Scots pine deals, $\frac{1}{2}$ inch thick	0	8	per sup. yard.
" $\frac{3}{4}$ "	0	10	"
" $\frac{1}{2}$ "	0	11	"
" $\frac{3}{4}$ "	1	0	"
" 1 "	1	2	"
" $1\frac{1}{2}$ "	1	3	"

Larch deals of the above dimensions are sold at 1d. per yard more. Willow boards and deals, 2d. per yard more than Scots pine, and beech of the same thicknesses, 2d. per yard less.

	s.	d.	
Scots pine staves, $\frac{1}{2}$ inch thick	40	0	per 1,000 sup. feet.
Poplar, willow, &c. staves, "	70	0	"
Larch "	80	0	"
Larch heading, "	85	0	"
Scots pine paling, $3\frac{1}{2}$ by $1\frac{1}{2}$	9	0	per 100 lineal yards.
Larch "	11	0	"
Spruce "	8	0	"
Scots pine posts, $5\frac{1}{2}$ feet long, round or split	11	0	per 100.
" $4\frac{1}{2}$ "	8	0	"
" $3\frac{1}{2}$ "	6	6	"

For larch of similar quality 1s. per hundred more is derived. About Edinburgh, as elsewhere, great demand is made for larch, for telegraph poles and fencing posts, for which, if of superior quality, 2d. and 3d. per lineal foot is paid. Finding it impracticable to go over all the districts in Scotland affected in price by railroads, &c., without unduly extending the subject, I will conclude by a few quotations and remarks upon the prices of wood in Roxburghshire.

Previous to the extension of the North British lines to Hawick, Jedburgh, and Kelso, the only demand was by local tradesmen, and for use on the estates upon which it was grown; and the wood, which was usually cut, lotted, and sold by public auction, was purchased by persons in the immediate neighbourhood, as for want of cheap means of transit, it would not pay to convey it to remote distances. Prop-wood was never thought of as a marketable product; hence, all such wood, when not required on the estate, was allowed to rot upon the ground. It is now conveyed to the Lothian and other mines at a rate of carriage leaving a small but favourable margin to the proprietor.

Oak also, which the old Jed Forest, Rule-water, Minto House, Dod, and other places yielded, if not purchased by local carpenters, was bought by Berwickshire wood merchants, at a price so low that it paid the long carriage to Tweedmouth for ship-building. The railway system has, however, wrought considerable improvement in this respect, and now, when an important wood sale takes place, wood merchants come from Edinburgh, Newcastle, Carlisle, &c., and all sorts of wood is bought at such prices as will pay the carriage and leave a margin of profit to the purchaser. The annexed prices are such as are realized for the best quality of the different kinds of wood at the auction sales, within a short distance of a railway station:—

	s.	d.	s.	d.	
Larch	0	10	to	1	3 per cubic foot.
Scots pine	0	10	„	1	0 „
Spruce	0	8	„	0	9 „
Ash	1	3	„	1	6 „
Elm	1	6	„	2	0 „
Oak	1	6	„	2	3 „
Beech	0	8	„	0	10 „
Birch	0	8	„	0	10 „
Sycamore	0	10	„	2	0 „
Alder	0	8	„	0	10 „
Lime tree	0	10	„	1	0 „
Poplar	0	10	„	1	0 „
Willow	0	10	„	1	3 „
Sweet chestnut	1	3	„	2	0 „

Scots pine rails, $3\frac{1}{2}$ by $1\frac{1}{2}$, are sold at 1d. per lineal yard, and posts of good quality, at about $\frac{3}{4}$ d. per lineal foot, while larch realized about 1d. per lineal foot. Larch bark of best quality realized £3 15s. per ton, delivered; and oak bark, shipped and delivered, £6 10s. per ton; birch bark, £3 2s. 6d. per ton.

Scots pine, common pit-props, 2s. per 72 feet.

„ crown „ 3s. 6d. „

The writer will next quote the prices of wood, &c., in distant markets, such as Newcastle, Glasgow, &c., where prices are now so nearly equal, that for all practical purposes they may be considered the same:—

	s.	d.	s.	d.
Scots pine sleepers, 9 ft. long, 10 by 5	2	6	to 2	7 each.
" " " 9 " " 4½	1	4	" "	1 6 "
" " " 8 " " 4 "	1	0	" "	1 1 "
" " 3 ft. 9 in. long, 5 by 2	17	0	per 100.	
" " 3 " 6 " " 5 " 2	16	0	" "	
" deals, in 12 ft. lengths, ¾ in. thick	7	0	per 100 sup. feet	
" " " ¾ " " "	8	0	" "	
" " " 1 " " "	10	0	" "	
" staves for barrels, ¼ in. thick	26	0	to 28 0 per 1,000 ft.	
" " ⅝ " " "	35	0	" "	
" heading " ¾ " " "	40	0	" "	
" " " ⅞ " " "	45	0	" "	
Plaster laths, ⅜ thick.....	3	6	per 100 feet.	
Paling rails, 12 ft. long, 3½ by 1½	8	6	per dozen rails.	
" " " 4 " " 1½	4	6	" "	
Paling posts, 6 " " 6 " " 3	4	6	" "	
" " 6 ft. 4 in. long, 7 by 3½	6	0	" "	
" " per cubic ft., clean and good	0	8	to 10d.	
Sparwood, 6 ft. long, 6 in. diameter	0	1½	per lineal ft.	
Common pit-props 3½ " "	3	0	per 72 feet.	
Crown props 5 " "	5	3	" "	
Scantling, per cubic ft.....	1	2	" "	
Spruce and silver fir sleepers, 9 ft. long, 10 by 5	1	8	each.	
Larch railway sleepers, 9 " " "	3	6	" "	
" " staves, ⅝ in. thick	70	0	per 1,000 feet.	
" " ¾ " " "	84	0	" "	
" " pit props, 3½ in. diameter	5	10	per 72 feet.	
" " 4½ " " "	6	6	" "	

As with wood, so with labour, since the railway extension ; indeed, the rate of wages and cost of different kinds of labour are now so far equalized all over the country as to be considered nearly alike. Where a difference does exist, or rather appears to exist, it is found practically to be more the appearance than reality, because the rate of wages paid does not always represent the value of work, one man being dearer at 2s. per day than another at 3s. On some estates the men are paid full time summer and winter, hence can afford to work for 1s. or 1s. 6d. per week less than others with broken time. The rate of wages, however, where the men are paid only for the hours they work, are from 2s. 2d. to 2s. 4d. per day,—2s. 8d. per day (full time) ; hedgers, without house or perquisites, 2s. 8d. to 3s. per day (full time). Women are paid from 10d. to 1s. 2d., according to time engaged and kind of work. The following are the usual prices for cutting drains :—

<i>Draining.</i> —26 in. wide at top, 15 in. deep, and a spade		<i>s.</i>	<i>d.</i>	<i>s.</i>	<i>d.</i>	
	width at bottom,			5	0	per 100 yards,
„	30 „ 20 „	6	0 to 7	6	„	
„	36 „ 24 „	8	4 „ 9	6	„	

Wire Fencing.—Six wires upon wood or iron strainers, posts driven, 6 ft. apart, 8s. 4d. to 12s. 6d. per 100 yards; four wires, as above, 6s. to 10s. per 100 yards. Tarring the posts and wires, 2s. per 100 yards for the former, and 1s. 8d. per do. for the latter. Cutting and pruning wood, from pit-prop size and upwards (not including timber), 2s. 6d. to 7s. 6d.

sumed ; a quantity equal to the whole growth that is produced in this country is consumed annually in railroads alone, hence for all works, besides the quantity used by railways, foreign wood must be used, and when it is known that about ten million cubic feet are consumed annually in this country alone, and about 50,000 acres of the best of the North American forests falling annually to the woodman's axe, it is high time for those whom it concerns to look to their forests. Any who have forest produce to sell can, with little difficulty, know to within a trifle, by studying the price in the market, what his standing or cut trees should fetch. If the market or demand is local, the price will be high, but if it requires long carriage, as from Strathspey to Glasgow, 13s. per ton must be allowed ; or, as in the case of pit-props in Jed Forest, which are scarcely worth half the money they fetch at Newbattle, Arniston, &c., the carriage making the difference.

The prices herein given were those current about eight years ago, and are now in most cases too high, owing to the fall in price of most articles ; and, even within that period, other circumstances have arisen in certain districts which will doubtless make some further slight alterations in prices of produce or cost of labour, &c.

C. Y. MICHIE.

THE IRISH LAND BILL.

THE reclamation of waste land forms one of the principal points in the Irish Land Bill now before Parliament, by which the Government purpose to improve the depressed condition of the rural population of Ireland. In every part of that country one sees abundance of land which only requires the introduction of modern methods of cultivation, and persevering energy to apply them, to render it the most profitable land to the possessor that can be found in the United Kingdom. The proposed "reclamation" does not, of course, apply to land of this nature, already reclaimed so far as to be included under the term "cultivated" land. How much of the vast extent of "waste" land, which is so conspicuous a feature in many parts of Ireland, can be made fit for agricultural purposes, and give a profitable return to the possessor, is a question that it would be well to consider thoroughly before the country embarks in any such enterprise. It is exceedingly doubtful if any extent of those waste lands can be profitably reclaimed in these times for agricultural purposes, except on the most limited scale and by the industry of private individuals. The low prices of every kind of agricultural produce, and the great probability of even lower prices ruling as the means of communication improve and develop between this and other countries, render it almost an impossibility to make second or third rate arable land pay for cultivation in this country ; therefore it seems

a hopeless task to attempt to reclaim, for purposes of cultivation; the vast areas of third rate and utterly waste land in Ireland, while it is highly advisable that it should be utilized in some more profitable manner than at present prevails. Where the soil is of a first or second rate nature, every reason approves of it being chiefly devoted to the production of food for man and beast; but only a starved existence can be by any possibility scraped out of third rate land in these days, and the lot of the poor man who has to toil hard for it is not to be envied. However, there is luckily another sure process by which the waste lands of Ireland can be rendered profitable to the owner and made to supply a vast amount of healthy employment for the working population of the country, and that is by planting them with trees for the production of timber, and of many other articles which we import extensively, at high prices, from other countries. Timber and other forest products are every year becoming scarcer and dearer, with no prospect of the foreign supply ever being greater than at the present time, so that the planting of waste lands on an extensive scale is likely to be one of the most remunerative investments which can be made in this country. If the Government gave encouragement for extensive planting in Ireland, or by some well-devised scheme would carry out the work under its own direction, it would confer an everlasting benefit on the country, and find profitable employment for hosts of the idle or only half-employed population which inhabits so much of the rural parts of Ireland.

THE HAZEL (*Corylus*) Order, *Corylaceæ*.

THE hazel is a deciduous shrub rather than a tree, growing to a height of about twenty feet. It is most valuable as a free-growing underwood.

1. *Corylus Avellana* is a general coppice plant upon loamy soils, which may be propagated either from the nuts, from grafts, from suckers, or from layers. As the produce from the seed of other kinds is so uncertain, it is argued that they are all merely varieties of the common hazel.

It is indigenous to temperate Europe, and grows in some very elevated sites in the Scottish Highlands. It prefers a dry soil upon chalk or sandstone, and may often be seen growing from the fissures of rocks, where the nuts have been dropped by birds or squirrels.

The hazel is much cultivated in pottery districts, such as Staffordshire, on account of its use in making crates for goods. It is

also in request for rustic work, and for making close and warm sheep-gates. The wood makes good charcoal, which is serviceable in the manufacture of gunpowder, and in making black paint. The oil from the hazel-nut is but little inferior to that obtained from almonds. The hazel is also cut for stakes and binders for the hedger, and for withes for tying up oak-top and other fagots. It is also in request for the smaller kinds of hoops, called in some parts of the country, "smart-hoops."

The species takes its name from Avellano, a city of Naples, around which it was extensively cultivated. It was first brought to Italy from Pontus, and hence it was to the Romans known by the name of *Nux Pontica*.

The trunk of the tree has generally a whitish-brown bark, which is frequently much cloven, though that upon the branches may be quite smooth. White spots often appear upon the rind. The leaves are alternate and much wrinkled. The male catkins make their appearance in autumn.

If intended to be sown in spring, the nuts should be preserved in moderately dry sand until February. A bed ninety feet long by four feet wide will take a bushel of good nuts, which may be covered from one to two inches deep with fine soil. Strong plants may be removed at the end of the first year, while weaker ones are allowed to remain for two years. For producing good standards, they may be planted out in rows, twenty-four inches by ten inches.

Amongst other uses of hazel rods, Evelyn states that they are well adapted "for riding switches, and divinatory rods, for the detecting and finding out of minerals."

2. *C. rostrata* is remarkable for its length of calyx, which completely covers the nut. It is a native of Virginia, and was introduced to England in 1745.

3. *C. colurna* is the Constantinople hazel, whose racemes are very large—double the size of those of the common hazel, though similarly shaped. The soil best adapted to its growth is a strong loam, upon either a clay or a marl bottom. Upon its own soil it attains the height of a timber tree, with a whitish-coloured bark, and branches growing in a horizontal position. It is a very hardy tree. It was introduced to England by John Rae in 1665. A large tree of this kind, growing in the Leyden gardens, in 1736, and which had been planted there a century earlier, is mentioned by Linnæus. A fine specimen of it, once to be seen growing at Sion, near London, was sixty feet high.

There are many varieties of the nut and filbert trees throughout Great Britain, such as *C. alba*, or the white filbert; *C. rubra*, or the red filbert; *C. ovata*, or the oval-fruited; *C. grandis*, the large cob-

nut ; and *C. glomerata*, which produces its fruit in large clusters at the ends of the branches. There is also the *C. Barceloniensis*, or Spanish filbert.

The best filbert or nut soil in Kent is found upon a strong loam. When the standards are cultivated ten or twelve feet apart they admit of green crops intervening, and the working of the latter with the fork and the hoe is of great benefit to the nut trees. The filbert trees are kept pruned to a height of about six feet, with a diameter of the same extent. With good cultivation the fruit of some of the choice kinds will sometimes fetch as much as £50 per acre.

The squirrel and the nut-hatch are the chief depredators to be guarded against where nuts are grown. Both these are very destructive to the crop, and their instincts direct them to well-filled nuts, so that it is but seldom either of them waste their energies upon an empty shell.

Pluckley, Kent.

A. J. BURROWS.

EFFECT OF THE DECOMPOSITION OF PRUNINGS.

(Continued from page 23.)

IT is an acknowledged fact, that fir trees will not always grow where a previous fir plantation was but recently cut, and experience taught planters that, as a general rule, it was necessary to allow a period of six years or thereabouts to elapse, after cutting down one, before planting another. The reasons why this was thought necessary were very numerous, but contradictory, and far from the true cause until Messrs. Baldwin and MacCorquodale, of Scone, discovered the real depredator, in the *Hyllobius abietis* in 1840 and 1841. In 1851, (Scottish Arboricultural Society's Transactions, vol. 2, p. 51), Mr. MacCorquodale produced further proof in support of the fact that it was a fallacy to ascribe the failure of plants to grow immediately after an old wood was cut away, to exhaustion of soil, after producing say 6,000 cubic feet of timber per acre, and that the soil, therefore, required a rest, or a sleep for a time, like an exhausted man, in order to recruit before again putting forth its energies in producing another similar crop ; but that these failures were entirely due to the ravages of the weevil, because, when he burnt all the rubbish previous to planting (a never-failing remedy), all his plants came on most vigorously.

3rd. "Those which feed chiefly on the growing timber of trees, of which *Hylurgus piniperda*, or the small pine beetle, is a fair type." I found them in the various stages stated in this *Journal*, p. 215, vol. iv., and Selby, in his "British Forest Trees," p. 424, supports my observations.

J. W., in *Journal of Forestry*, vol. ii. p. 195, told how, in June, he found the pith of the young Scotch and Austrian firs eaten out and a dark-brown maggot inside. Mr. Craig says, "I have opened shoots at all seasons of the year, but never found anything but the matured beetle." This requires further explanation before being adopted. He further says, "I have been making a search in some old bark and found the insects both in the grub and full-grown state. These were obtained in the bark of some young Scotch fir thinnings, that were left lying in the plantation; and I believe they also breed in the corky bark of old fir trees. What strengthens my idea is the fact that I find them do more harm in young plantations here, near to old fir trees, than where there are none." He might have found some such insects as he describes, but I submit that he does not produce sufficient proof to show it to be *Hylurgus piniperda*. That these insects do more harm to young firs near old trees, than to those where no old trees are, lends no support to his theory beyond the fact that, because caterpillars began in a plantation, they should be unceasingly there so long as a tree lived to afford them foliage food. The plantation I mentioned, p. 213, vol. iv., has never suffered since from those insects. At the time of their attack they only affected many of the young shoots; the trees increased in size of root under the ground, and in thickness above the ground, much the same as if not affected by beetles at all. True, they made the trees unsightly for one or two years; but that was perhaps the worst injury done. Although this insect has just lately had its full share of public attention, that is no proof that it has not existed in our plantations for hundreds of years, disappearing from a district it may be for so long a time as to be all but forgotten, then appearing perhaps not in the same plantation again, but in some others in the same district with more or less severity, then off again, and that entirely without man's intervention.

By way of trying to get a peep into that corner of Nature's wonderful workshop, where insects injurious to trees are kept within their present limits, I here quote a few observations from universally acknowledged authorities upon the subject. Mr. R. Hutchison, of Carlowrie ("Transactions of the Scottish Arboricultural Society," vols. 7 and 9), and Dr. Carpenter, in his "Zoology," vol. 2, tell us, that so numerous and destructive were the *Bostrichus typographus*, or the Typographer Beetle, in the Hartz Forest, in Germany, in 1783, that they destroyed a million and a half of trees; that eighty thousand insects might be engaged in the destruction of each tree, and that the whole number at work in the forest at once, must have been one hundred and twenty thousand millions; but unfortunately we are not told what was supposed to have caused them to be there in such great

numbers, nor yet what was done to put a stop to their ravages; but we are told that the cold and wet seasons of 1784 and 1789 tended greatly to diminish their numbers. I am informed that in Scotland we have but little conception of the damage done to forests by those insects; that the ravages of those referred to are chiefly confined to the continent of Europe, while in Great Britain their attacks, although they have been noticed, are not as yet to any great extent frequent or serious. I now give some extracts from the "Injurious Insects Report," 1879, by Miss A. E. Ormerod.

"The season when insects are most injurious to coniferous woods is generally from the beginning of April to the end of June, and again from about the beginning of August till the middle or end of September, in favourable and mild weather or ordinary seasons. Of course, cold or wet weather may affect their operations, but, as a rule, these are the times of the year during which the greatest havoc is committed. Hot and dry summer weather, especially if succeeded by a cold, dry, frosty winter, favours the dissemination and increase of forest-feeding insects. Spallangani observed no loss of vitality by a four hours' exposure to a cold of 38° below zero, and even found some eggs hatched after a subjection to a cold of 56° below 0° . The warmth of summer fosters their breeding, because by its genial influences their period of transformation from the larva state is shortened, and abundance of time is afforded for several broods to mature in succession; and when the following winter is dry a superabundant number of insects will be found in the ensuing spring, while on the other hand, should the summer season prove wet and deficient in sunshine, and the following autumn and winter be damp, intensely cold, or snowy, the number of insects, whose increase had been previously checked by the adverse summer, will be materially lessened in the following spring, and the destruction to the woods for the time will be proportionately less.

"The abundance of the Aphis affecting the beech during the last two years is thus easily explained, for while the wet summers and cold autumns and winters are most inimical to the existence of the lady-bird (*Coccinella septempunctata*) and other insects, as well as of many birds, whose natural food the Aphis family form, these have been suffering severely, and perishing in thousands during the two last very severe winters and ungenial summers, or have been absent from our shores altogether. Hence the undue increase of this pest, and the consequent destruction to our beech trees and hedges.

"In 1878, it appeared from the observer's notes that a moist and mild winter had been followed by luxuriant vegetation, and unusual absence of any great amount of insect damage. This season the case has been different. The weather characteristics of the observer's year, beginning with November, 1878, have been temperature below the average, and rainfall above the average, with little sunshine, and the returns show insect-attack fully up to the usual amount, and insect presence often exceeding it. The unusual cold of the winter and the depth to which the frost penetrated the ground (from 1 to 2 feet in Scotland) do not appear to have acted prejudicially on larvæ (or grubs subjected to them), either at the time or in subsequent development, and the only cases in which the weather appears notably to have had effect in ridding us of insect-attack is where the persistent rainfall or tremendous downpour of summer storms have fairly swept the insects from the plants, or in some cases of leaf-feeders, where the plant-growth has (conjecturally) been driven on past the power of the larvæ."

From these extracts we learn that, as a general rule, the state of the weather has a very great deal to do with the increase and decrease of insects. On the one hand the tendency of a dry frosty winter is to preserve all insect germs in an unimpaired condition, and a dry warm summer, succeeding such a winter, tends to excite these germs in the greatest activity and consequently to the greatest increase of insects; while, on the other hand, a mild, open winter, with but little frost, succeeded by a mild, genial, damp summer has the very opposite effect upon insect life.

We also learn that the lady-bird, and other insects, that make herbivorous insects their prey, as well as ordinary insectivorous birds, are killed in thousands by hard frosty winters, although a mild hot summer might enable those that survived the severity of the winter, to increase again in thousands and devour insects by the million. Yet, in the face of all the great killing powers of those birds and insects, we see and hear of overwhelming numbers of insects destroying tree foliage and the young wood of trees for two or more years, as if they had not a single enemy in the whole world, and then all of a sudden vanish, and where to?

Mr. Hutchison further says, "The lady-bird and allied species are the only effectual checks provided by Nature for restraining the wonderful multiplication of the Aphides. All plans and schemes, however practical, which may be suggested, will be found of little avail to extirpate so rapidly increasing a foe, and the best policy would seem to be for the forester to study the economy of the Aphis under notice, and of any other similarly destructive insect, and to further, so far as may be in his power, the increase of any of the natural foes, whether bird or insect, which prey upon it."

Difficult as the question before us is, I fail to see so very much hazy gloom about it after all. Attention has already been called to two very important facts relating to it—the one is the wonderful increasing powers of insects, and the other that, notwithstanding those powers, there are still facts wanting to prove that injurious insects are now more numerous in our woods and plantations, than they were many years ago. We have also seen that however many of them birds and carnivorous insects may destroy, there are no facts advanced to prove that the sudden disappearance of overwhelming numbers of these injurious insects, is due to their destruction by birds and insects, and still there must be some natural, although unseen causes for it all.

Insects have got breathing and assimilating organs, and circulating fluids, however microscopic, somewhat analogous to those of man and other animals, liable to derangement from various causes, which are prone to end in death. The accumulated excreta of living animals

and the dead bodies of others in a state of decay, get full of parasitic fungi, and make the surrounding atmosphere very pestivorous to that class of animals, whose excreta and dead are thus decaying, in consequence of it being loaded with injurious germs. Town authorities reveal alarming instances at times of the very injurious effects of badly kept cow-houses, milk-houses, cess-pools, and sewers, especially in damp, shaded, sheltered places, in warm summer weather, and instances are not wanting of cases of sickness and death becoming so very numerous, as to assume all the appearance of a plague, through want of attention to well-known sanitary laws. And where could these plague-making requirements be more numerous than in a wood with trees all hanging with insects? Looking at the subject from this standpoint, can it be wondered at, although the third season of a visit from those insects, we should find them to be but very few. In the August issue of the *Journal* I showed that, in point of fecundity, there is perhaps nothing in Nature to equal insects except fungi. I showed that live animals as well as plants are liable to the growth of fungi within their bodies, and how fatal such growths become.

In vol i., p. 252, of the *Journal*, I find Mr. Scott saying, "Immediately after the larch bug lays its eggs, about the second week of May, the insect gets enveloped in a coating of parasitic fungi," and I would add, the germs of which must have been developing unseen in the constitution of the insect, until it ultimately overpowered all its vitals, and killed it, as it does silk-worms in France (see August issue). One of three *Hylobius abietis* which I had in a bottle was killed in the same way last Autumn.

All these facts, I submit, point to some species of parasitic fungi, being of all others the most deadly foe insects can possibly have, and that through all ages kept them within due bounds in the forest, until now, and the closer we follow Nature in maintaining a shaded atmosphere in our forests, the more we encourage our parasitic friends to abide with us, and this can best be done, and with the greatest economy, by leaving all decaying rubbish that cannot be profitably sold to decay there.

D. MCCORQUODALE.

NOTES REGARDING EUCALYPTS.

AT the last meeting of the Edinburgh Botanical Society, Mr. Taylor read a letter from Colonel Campbell, South Hall, Colintrave, Argyllshire, describing an *Eucalyptus globulus* in his garden, planted out nine years ago, and now 45 feet 9 inches high; the girth 6 inches from the ground is 33 inches; girth 5 feet from the ground 28½ inches. It forms itself into two branches of

equal size, 6 feet from the ground. It is rather bare of small branches for 15 feet, some of which have died off; but the upper part is very vigorous and healthy. Colonel Campbell has never succeeded in growing this plant except from seed; though some thus raised and planted out in the autumn were killed by the frosts of last October, which, however, did not injure the old tree.

The garden at South Hall has a good exposure to the south, is well sheltered, and stands about 25 feet above the sea level. So mild is the climate, that two large camellias and a kalmia, close to the eucalyptus, have flourished in the open for the last twenty years.

In the recently issued part of the Proceedings of the Literary and Philosophical Society of Manchester, Mr. Edward Binney gives details regarding an *Eucalyptus globulus*, which he had planted in his garden, at Douglas, Isle of Man, within fifty feet of the sea, and six feet above high-water mark. Its situation was sheltered from the winds by high walls, and the soil formed of the *débris* of Manx schist, and was believed to contain a considerable amount of potash. The tree has never been manured. In three years it had reached twenty-feet four inches in height. During the winter of 1878 and 1879 its foliage and branches deteriorated. It has not grown much in height during 1879 and 1880, being now higher than the sea-wall, but the diameter of the stem shows increase.

In the same volume, Mr. Watson Smith, F.C.S., gives analyses of the ash of two species of Eucalyptus — *E. rostrata* and *E. globulus*. They were made at the request of Dr. James Young, of Kelly, and obtained at a joiner's shop in Zurich, which was fragrant with the odour of the gum or essential oil peculiar to the tree. The wood of the first-named, or red-gum variety, was so hard as to turn the joiner's plane; that of the blue-gum being a little below it in point of hardness and solidity. After the sections of both varieties had been placed in a dry atmosphere for a month the specific gravities were taken, and subsequent analyses made, with the following results:—

<i>Eucalyptus rostrata</i> Red-gum.		<i>Eucalyptus globulus</i> Blue-gum.	
Spec. gravity	0.8112	Spec. gravity	0.772
Ash	2.25%	Ash	2.01%
K ₂ O	9.50	K ₂ O }	25.0
Na ₂ O	3.40	Na ₂ O }	
Mg O	6.30	Mg O	6.47
Ca O	43.80	Ca O	35.08
Ferric and aluminic phosphates	0.78	Ferric and aluminic phosphates	1.07
Mn O	trace	Mn O	trace
Si O ₂	0.29	Al ₂ O ₃	trace
S O ₂	1.57	Si O ₂	0.34
Cl	0.60	S O ₂	1.65
Sand and carbon	1.77	Cl	0.85
		Sand and carbon	1.04

The very large percentage of the alkalis, specially potash, soda, and lime, is so marked, as to raise the query, if peculiarities of soil should not be as much attended to as climate, in attempts to cultivate these beautiful Australian trees. Dr. Watson further remarks that the leaves contain so much tannin, as to render these trees very valuable sources of it here, were they largely cultivated.

A. T.

NATURAL AND TRANSPLANTED LARCH.

IN the *Journal of Forestry* for March last, I notice the following question asked by Mr. George Wyllie, Ballogie, Aboyne: "I find on this estate and neighbourhood that the natural grown larch are almost free from disease, whilst our transplanted ones, in many cases, are failures; will any of your numerous readers give us the reason why the natural larch are healthier than the transplanted?" As no reply to this important inquiry has yet appeared from any of the numerous correspondents of the *Journal*, I send the following remarks as the result of my own experience.

The cause then, in my opinion, of such a perceptible difference betwixt natural grown and transplanted larch may, in the first place be attributed to the comparative indifference shown by forest-tree propagators and planters generally, as to the careful selection of larch cones, which are often gathered from dwarf, stunted, and diseased trees, which are frequently found literally covered with cones. From off such trees seed gatherers most naturally fill their sacks first, as they are more accessible than sound lofty trees. The collectors are commonly paid by quantity, and not according to quality. Large cones are, however, often obtained from newly felled trees, and young men, experts at climbing, ascend tall growing trees and procure fine well-formed cones, but seedsmen buy up all, both large and small, unless they appear altogether worthless, and store them all up together without distinction in the same heap. The seeds are afterwards extracted from the cones, sown in early summer, and in eight months after the plants have attained to the size of one year seedlings. In the same bed are usually found two and three classes of plants, resulting doubtless to a great extent (although not altogether) from the mixture of strong and weak seeds.

The success and value of all crops, whether farm, garden, or forest, depends in a great measure on the quality of the seeds sown. That farmers and gardeners generally are fully cognisant of this fact, is evident from the care and attention they invariably bestow in

raising and procuring their seeds from the best possible sources. The consequences following the neglect of this precaution, in the proper selection of annual seeds, even, is often ruinous and disappointing in the extreme to all concerned. How much more disappointing, then, must it be to the forest tree planter after laying down a crop of larch, which takes upwards of a hundred years to ripen, to find after a few years' growth, that his plants were the produce of inferior and comparatively worthless trees, from which he cannot expect to obtain valuable timber trees.

If seedsmen, throughout this country and on the Continent, where the larch is indigenous, were to adopt the plan of employing only trustworthy and experienced men as seed collectors, and were to pay them by the day for selecting and gathering only the largest and best cones from off superior and healthy trees, instead of by quantity, the growers of larch timber might reasonably expect to have the pleasure and profit of finding in the offspring the same measure of health and vigour which is so characteristic of the parent trees. The existing semi-pilfering system of procuring cones in this country is anything but commendable. I have frequently heard of squads of cone gatherers, after a laborious day's work, having their sacks taken from them and emptied by the forester of the estate, on account of their having by the use of long crooks broken the branches of trees in drawing them down, in order to get the cones off them. If seedsmen were to make arrangements with the proprietors or foresters of estates for the privilege of getting cones off their trees, and, at the same time become responsible for damage done to trees by thoughtless persons, the result would certainly be more satisfactory to all concerned. I am aware that a small minority of seedsmen do get supplies of cones in this way from foresters of estates, and they should all endeavour to obtain them in the same manner.

In the event, however, of such a system of collecting cones from off sound healthy trees only, proving impracticable, then the only remaining alternative should be more strictly adopted, and that is, the careful *selection* of larch plants at the time they are being lifted out of the nursery ground for planting into their final destination, by retaining for this purpose only the very best and consigning to the rubbish heap at once all the scraggy and inferior ones, for even although one or two years' more nursing may make them appear fairly saleable plants, yet nevertheless, the majority of them are most undoubtedly the produce of sickly and consumptive trees. This method of collecting seeds, and selecting the plants might, however, considerably raise the price of larch plants, but no experienced planter would any more hesitate to give proportionately higher prices for sound hardy plants, than a farmer does to pay additional prices for

well-bred animals to found a superior and lucrative cattle or sheep stock.

Another cause of disease in larch is the planting of larch trees by tens of thousands annually, in soils and situations quite opposite to that in which the tree has been found by experience to luxuriate and attain to a state of perfection. Soils favourable to the growth of larch are frequently found on the margins and sloping banks of water-courses, and the hollows and sides of depressions, in undulated moorland, and on mountain and hill-sides over which overflowing rivulets have been from time immemorial depositing the various kinds of soil carried down from the heights and summits. In such alluvial deposits, incumbent on a porous subsoil of gravel, or any other favourable material of a porous nature, at moderate altitudes, the larch will continue to prosper, provided good healthy plants—with all their roots intact—are used. But on the tops of exposed ridges, or bleak moorland, with a surface soil of retentive moss, incumbent on hard gravel, silurian or quartz rock, or other retentive sub-stratum, the larch will not thrive, but the native Highland Scotch pine, and *Pinus laricio* will on such soils be found to grow vigorously and well provided the ground before planting is thoroughly drained. Larch will not thrive many years either in rich, deep, fertile, low-lying, loamy, or mossy lands; in such it is very liable soon to become a prey to the various diseases which the tree is so very subject to.

Another reason why the natural larch are healthier than the transplanted is because the cones of diseased trees commonly adhere to the branches until, and often long after, the seeds have lost their germinating properties, and do not dispose of their seeds to the wind so readily as the best cones do, situated high up on the branches of lofty trees, fully exposed to the influence of the sun, and consequently not nearly so subject to being interrupted on their migratory journey as seeds from lower trees must be. Any weakly plants from inferior seeds, however, that may chance to grow up amongst the vigorous ones in the maiden soil are soon suppressed by the luxuriant growth of the latter. The reason, therefore, of natural-grown larch being almost exempt from disease is greatly owing to the genuineness of the seeds to begin with, and that the infant plants are not subjected to any ruthless treatment in nursing or permanent planting,—in their case nature has performed the operation of planting by her own mild hand, and in her own approved way.

D. STALKER.

PRICES OF CONTRACT WORK ON THE LONGLEAT ESTATE.

THE following is a list of contract prices given for the various descriptions of work done on the Longleat estate. So well and satisfactory does the system work here, both to the employer and workman, that every operation which can be fixed at a contract price is done by piece work; it has been found to act as a stimulus to workmen to become quicker and more expert at their work. Our labourers receive from 11s. to 12s. a week, and 1s. less in winter. The fencers and sawyers are paid 18s. per week when on day work; they are, however, mostly employed on piece work, at which they command good wages. I should mention that these contract prices are subject to a reduction of from 5 to 10 per cent. during the winter months, when labourers become more plentiful, which has been the case during the past few years, partly on account of farmers being obliged to dismiss all their surplus hands in consequence of bad times and seasons.

		s.	d.		s.	d.
Felling oak timber	per ton of 40ft.	3	0	to	...	...
" other hardwood	"	2	6		...	...
" fir timber	"	1	8		...	...
Grubbing out timber	"	3	6		4	6
Cutting underwood, 12 to 15 years' growth ...	per acre	8	0	"	11	0
Turning " " " " " "	per score perches	0	9	"	1	6
Getting out hurdle rods	per score	0	1		...	...
" " stakes	per dozen	0	1		...	...
" rake stems	"	0	1		...	...
" spade " " " " " "	"	0	1		...	...
" spick gad: for thatching	"	0	1		...	...
" broom handles	per 2 dozen	0	1		...	...
" rose stakes	"	0	1		...	...
" dahlia " " " " " "	per dozen	0	1		...	...
" kidney bean stakes	50 in a bundle	0	2		...	...
" pea wood	per bundle	0	1		...	...
" birch wood, for besoms	"	0	1		...	...
Stripping oak bark	per ton of 20 cwt.	21	0		...	...
Loading " on waggons	"	3	0		...	...
Chopping " " " " " "	"	8	0	"	10	0
Cleaving firewood	per cord	4	0	"	6	0
" " for charcoal	"	2	6	"	3	0
Burning charcoal	per bushel of 20lbs.	0	2	"	...	...
Digging clay	per yard	0	5	"	0	6
Loading and spreading soil or manure ...	per cartload	0	5	"	0	6
Open ditching, mains, or for drying wood rides, 30in. deep, 36in. wide at top, and 9in. at bottom	per chain	3	0	"	4	0
Cleaning or scouring out ditches and mains ...	"	0	9	"	1	6
Small open ditches, 15in. to 18in. wide at top, 12in. to 15in. deep, and 9in. wide at bottom	"	1	6	"	2	6
Cleaning or scouring out small ditches ...	"	0	6	"	0	9
Pipe draining, mains, 4ft. 3in. deep, 4 to 6in. pipes	"	2	6	"	3	6
Pipe draining, small, 4ft. deep, 1½in. to 2½in. pipes	"	1	9	"	2	9
Pipe draining, small, 3ft. 6in. deep, 1½in. to 2½in. pipes	"	1	6	"	2	6

		s.	d.		s.	d.
Digging holes for ornamental or specimen trees, 5ft. to 8ft. square, and 2ft. deep ...	per dozen	2	0	to	3	0
Digging holes for forest planting, 12in. to 15in. square, and 9in. to 12in. deep ...	per 100	1	6	"	2	0
Making bank for quick hedge 4½ft. wide at bottom, 2½ft. at top, and 15in. to 18in. high; digging ditch, 36in. wide at top, 30in. deep, and 9in. at bottom, and planting quicks ...	per chain	7	6	"	10	6
Hedge without bank or ditch, trenching ground, preparing bed and planting ...	"	3	0	"	4	0
Laying hedge and scouring out ditch ...	"	2	0	"	3	0
Trimming hedge, full-sized ...	"	1	0	"	1	6
" and cleaning young hedge ...	"	0	6	"	1	0
Quarrying stone for making and repairing roads ...	per yard	0	10	"	1	3
Breaking stone for making and repairing roads	"	0	8	"	1	0
Getting out, cleaving, & mortising 4-holed posts	per score	3	6	"	4	0
" " " 3 "	"	2	6	"	3	0
" " " 2 "	"	2	0	"	2	6
" " " 1 "	"	1	9	"	2	0
" " rails ...	"	0	8	"	0	10
" " stakes ...	"	0	4	"	0	6
" " long pales ...	"	0	4	"	0	6
" " short "	"	0	3	"	0	4
Fixing 4-rail mortised fence, and 2 wires ...	per chain	4	0	"	4	6
" " " " 1 wire ...	"	3	6	"	4	0
" " " " ...	"	3	0	"	3	6
" 3 " " ...	"	2	6	"	3	0
" 2 " " ...	"	2	0	"	2	6
" 1 " " ...	"	1	9	"	2	0
Oak, park paled fence, running 4ft. 6in. & 5ft. 7 oak posts, 6 × 5in. × 7 ft. 3in. long, at 4s. 6d. ...	£1 11 6					
132 ft. oak rails, 3½ × 2½ in., at 3½d. ...	1 15 9					
56 oak pales, 5 ft. × 4 × 1 in. at 7d. ...	1 12 8					
49 oak pales, 4 ft. 6 in. × 4 × 1 in., at 6½d. ...	1 6 6					
7 lbs. patent rose nails at 3d. ...	0 1 9					
Preparing and fixing, per chain	0 7 6					
5 bar oak field gate, each ...	0 17 0					
" posts, per pair ...	1 3 0					
Iron fastening, and ironwork complete	0 5 9					
Fixing ...	0 4 6					
5 bar oak half-gate, fixed with posts, ironwork, and lever fastening, complete						
N.B.—6 bar gates, in each case, 1s. extra.						
Oak garden wicket-gates, about 3 ft. 6 in. × 3 ft. wide clear, with ironwork, oak posts, and fixing ...						
Making 5 bar oak gate						
Do. half-gate ...					2	6
Do. Rough wickets ...					1	8
Do. Wrought do. ...					2	0
Fixing gate ...					3	0
Do. half-gate ...					4	6
Fixing pair gate complete					3	0
Do. stile ...					6	0
Framing and fixing stile					2	0
Sawn larch mortised fence, materials, creosoting and fixing complete, 4 rail ...					3	0
	per chain	40	0	"	45	0

		s.	d.	s.	d.
Sawn larch mortised fence, materials, erecting, and fixing complete, 3 rail ...	per chain	35	0	40	0
Do. " " 2 " ...	"	30	0	35	0
Do. " " 1 " ...	"	20	0	25	0
Six-wire fence, larch posts and creosoted ...	"	35	0	40	0
Fixing do. ...	"	4	6	5	0
Making hurdles, small larch thinnings ...	per dozen	6	0	7	0
Do. (park) ...	"	8	0	10	0
Do. (wattle) ...	"	3	6	4	0
Do. Welsh (split ash), for sheep ...	"	4	0	5	0
Do. " for cattle ...	"	5	0	6	0
Getting out and cleaving posts, rails and pales, for tree guards ...	per set	0	9		
Fixing do. ...	each guard	2	0		
Sawn larch tree guards, 5 ft. 6 in. high, 3 posts, 5 upright pales on each side, 3 cross bars ditto, nails and fixing complete ...	each	12	0	15	
Sawing hardwood ...	per 100 ft.	2	6	4	
Do. softwood ...	"	2	6	3	0

Rides, drives, and shooting tracks are all trimmed in autumn by contract, at so much for each keeper's "beat," varying in price according to size; and in some cases two or three "beats" are put together and done under one sum.

GEO. BERRY.

WHAT IS TO BE DONE WITH LAND?

WHATEVER may be the case in Ireland, there is certainly no land-hunger in England, where we see thousands upon thousands of acres unoccupied or but imperfectly cultivated and the farm-buildings fast going to decay, and I hear and know of farms being let for 1s. and 2s. 6d. per acre that once were let for 18s. and 20s., say ten or fifteen years since. As to the causes of this state of things it would be almost impossible to say; they are no doubt many, and I, therefore, proceed to try to answer the question, "What is to be done with land?" that is, apart from planting it, as I think abundance of information has appeared in the *Journal of Forestry* to enable any one to decide on the profitableness or otherwise of planting. Now there is one question as to the occupation of land which is necessary to be settled first and it is *rent*; and here we must go back to the origin of this impost. It may be taken as an axiom that a *proportion* of what the land produces is the real basis of the rental of agricultural land, for if land will only produce sufficient for labour, seeds, rates, and taxes, of course there is nothing left for rent; an old formula was as follows:—

One-third of the produce for rent, tithes, and assessments.

One-third for seeds, tillages, &c., and the remaining third for the maintenance of the farmer's household and profit on capital:

That this formula is applicable now I do not say, but I do

complain that no formula is recognised at the present time, rent being imposed by a sort of "rule o' thumb," that is to say, such and such land is worth 20s. per acre, another piece is better, and is therefore worth 30s., and so on. This being the case, it becomes a matter requiring grave consideration whether the basis of rental should not again be reconsidered, as many things have altered within the last 25 or 30 years. Rent, rates, labour, &c., have risen, and this without a corresponding increase of produce. The question of what is a *fair* rent is prominently brought to the front in the Irish Land Bill, and it will require all the acumen of the Court to fix it, for it is a difficult problem, and, so far as I can see, must be settled according to the principles and origin of rent, namely, that a certain proportion of the actual produce of the land—*that is rent*.

The same principle is of course applicable to England, and every landowner has to fix a *fair* rent on his farms, and this can only be done by taking a proportion of the actual produce *in kind*.

The objections to this plan are:—

1. That it is going back to feudal times when so much of this and that produce was given up to the landlord and the Church.
2. That it would involve considerable trouble to the landowner and his agents, and might be considered inquisitorial by the tenants.
3. That it would not promote good farming, and might be an incentive to careless husbandry.

To the first objection it may be said that all feudal customs were not necessarily bad, and this one has at any rate a sound foundation; further, farming has been tried on what is called "commercial principles," and has no doubt failed, for no arguments will induce capitalists to invest in the business.

To the second I say that the landowner would be better to put up with the extra trouble than be obliged to employ an army of labourers and bailiffs, or see his land go out of cultivation; as to its being inquisitorial to the tenant, he should have nothing to conceal, and besides, he would have the satisfaction to know where to find his rent without being obliged to rush into the market with his produce, when by keeping it a little longer a higher price might be obtained—of course in many cases tenant and landowner would arrange for the money instead of produce.

There is little force in the third objection, as the landlord would only have his proportion whether the produce was four sacks or ten sacks of wheat to the acre, the farmer the remainder, equally advantageous or equally bad for both.

To practically carry out the above I venture to suggest—

1. That the farm-house, &c., the permanent pasture, woodland, &c., be at a money rent.

2. The wheat, barley, oats, pulse and hay to be at a certain proportion of the *produce in kind*.

3rd. Turnip and other root crops not to be rentable.

4th. Summer fallows not to be rentable.

I am of opinion that some such scheme must sooner or later be adopted, even if only for a time, for the purpose of arriving at what land will really bear in the shape of rent and assessments.

Romsey, Hants.

JOHN SMITH.

THE HOME FARM IN JUNE.

TURNIPS.—The principal crop should be got in this month.

Finish up Swede planting, and then get in the hybrid and white varieties. In a very dry season these may be better drilled on the flat. Use plenty of good rotten manure, where the roots are intended to be carried off, and a proportion of artificial where they are to be consumed on the land. Lime will be found valuable where the land is often under turnips.

Mangolds will require both horse and hand-hoeing, and careful setting out. Constant stirring in dry weather will greatly promote the growth of the crop.

Kohl Rabi, Rape, and Tares, for a last cutting, should at once be put in. Clean all corn crops, and top-dress wheat or oats, where backward and weak, with a little nitrate of soda. A good top-dressing for beans is 2 cwt. of gypsum and 1 cwt. of salt per acre. Hand-hoe and weed young lucerne. Clean and single parsnips and carrots, and put the brake through potatoes, and afterwards mould them up. Cabbage and kale may now be planted out from the seed-beds for use at the commencement of the winter.

Hops will require constant attention through the month, to keep the bine well to the pole, and exterminate weeds. Where the hills are very weak, substitute smaller poles for the large ones, and mend with some stimulating manure. As the bine reaches the tops of the poles ladder-tying will be necessary. Dig round the hills, applying manures where required. Where the bine shows signs of mould, apply sulphur at the rate of not less than 56 lbs. per acre. Dip and afterwards bed up new poles for the next season.

Live Stock.—Wash and shear sheep, and dip the lambs a few days after the shearing. Give barrens and tegs good keep with some cake or corn. Put the horses upon an allowance of green food and reduce their corn. Turn out yearling colts and give light work to strong two-year-olds. Cart tares and comfrey to pigs, and cut rye grass and lucerne for young stock, or for horses. Pigs may also be liberally supplied with wurzel. Cattle intended to be fattened upon the pastures will require some cake, unless the grass is very luxuriant.

Haymaking may be expected to commence before the end of the month. Trifolium, Italian rye, and mixed grasses, trefoil, sainfoin red clovers, and meadow grass will ripen in succession. Avoid too much exposure to sun and rain, and take pains to cock and shake out repeatedly in catching weather. Where the hay becomes injured by the weather, sprinkle a little salt amongst it when stacking.

Dairy.—In hot weather milch cows are better housed by day, and supplied with green food and water, and turned out by night. A frequent change of pasture is essential to good dairying.

Poultry.—The young turkeys should not be allowed to wander in wet weather, though the goslings and ducks may gradually have a more extended range. Fattening poultry should have forcing food, such as steamed or boiled buckwheat, and but little light.

Estate Work.—Complete the delivery of bark, and finish clearing the falls. As time admits, materials of all kinds for road-making, fencing, and general estate repairs may be carted where they are likely to be required.

A. J. B.

HUMAN TREES.

A MOST ingenious device to escape capture is that shown by the Bheel robbers of India. It often happens that a band of these robbers are pursued by mounted Englishmen, and, unable to reach the jungle, find themselves about to be overtaken upon one of those open plains which have been cleared by fire, the only shelter in sight being the blackened trunks or leafless branches of small trees that perished in the flames. For men so skilled in posturing this is shelter enough. Quickly divesting themselves of their scanty clothing, they scatter it with their plunder in small piles over the plain, covering them with their round shields, so that they have the appearance of lumps of earth, and attract no attention. This accomplished they snatch up a few sticks, throw their body into a contorted position, and stand or crouch immovable until their unsuspecting enemies have galloped by. When all is safe they quickly pick up their spoil and proceed upon their way. The Rev. J. D. Woods gives an interesting account of the marvellous mimics. I quote the following:—"Before the English had become used to these manœuvres, a very ludicrous incident occurred. An officer, with a party of horse, was chasing a small body of Bheel robbers, and was fast overtaking them. Suddenly the robbers ran behind a rock or some such obstacle, which hid them for a moment, and when the soldiers came up the men had mysteriously disappeared. After an unavailing search, the officer ordered his men to dismount beside a clump of scorched and withered trees; and the day being very hot, he took off his helmet and hung it on a branch by which he was standing. The branch in question turned out to be the leg of a Bheel, who burst into a scream of laughter, and flung the astonished officer to the ground. The clump of scorched trees suddenly became metamorphosed into men, and the whole party dispersed in different directions before the Englishmen could recover from their surprise, carrying with them the officer's helmet by way of trophy."

Oak Bark
Angos, owl
estates.

Sawmills at
Crown 2/1st
sorry to say

quality Wain

Grass of mixed
sw, 1/ per for
ing is for fill
ross planted
sech. Elm d
and Ash sold
re. Good d
little timber

ry Auction.

ark is for 23 c
ark is for fall
are dear, bon

mer gained h
her generally
rind.

ark is felled, p
Qualified 1/3 per
about 2/- per fo
trade bad, whic
are lower than
ended by Collie
at under last

ch locality.

THE JOURNAL OF FORESTRY AND ESTATE MANAGEMENT, *June*, 1881.

REMARKS.

0 Oak Bark this season fetched a comparatively low price, and there is but a small demand for fagots, owing to an immense number of trees having been cut in the locality on neighbouring estates.

Sawmills at Boxmoor, Berkhamstead, and Chesham are the means of keeping up prices.

0 Crinum 2/ 1st quality. We expected to have seen some improvement in trade this Spring, but sorry to say it is even more depressed than last year.

1st quality Walnut 1/3 per foot.

0 Trees of mixed trees planted, and 15 to 16 acres eaten off with rabbits, replanted. 1st quality saw, 1/ per foot. All the timber has gone to the Earl of Durham's Collieries this season.

Planting is for filling up deficiencies, 1st quality Walnut, 1/6 per foot, 1st quality Yew, 25/- per ton. Trees planted are chiefly Larch, 2½ feet apart, and pits dug for wholeness. Market overstocked with beech. Elm dull of trade. Oak bark very plentiful.

and Ash sold standing. The woods are rather over 1000 acres, being portion of the old forest of Hereford. Good demand for firewood, but little sale for timber.

Little timber sold this year. Oak sells best. Beech sells badly, much cut in county.

by Auction. 1st quality Walnut, 1/4 per foot.

mark is for 22 cwt. free on rail.

mark is for felling and peeling.

are dear, hence prices of cordwood and fagots.

finer grained hardwoods of any size can be disposed of to the Bobbin turners in the district. Here generally is cut into clog soles, and when sold in large lots they are blocked out on the pound.

mark is felled, peeled, chopped, and delivered to Tan Yard 8 miles distant.

0 Realised 1/9 per foot 1st, and 35/- per ton 3rd, used for chairmaking. No bark sold. 1st quality Walnut 2/- per foot.

trade bad, which brings Beech from 1/- in 1878, to -/6 in 1881.

are lower than usual in consequence of slack trade.

under by Collieries within 5 to 20 miles.

5/- under last season's prices.

OUR ANNUAL RETURN OF PRICES OF TIMBER, &c.

OUR Annual Table of the prices realized in the country for timber and other forest produce, which, in accordance with our usual custom, we publish this month, will be scanned with deep interest, in these hard times, by all who are in any way concerned in our rural industries. The past year has been one of the most trying of recent times for the owners and occupiers of land, and the prospect ahead is not promising of better times being near at hand for the landowner and farmer. Trade has long been in a languishing state, and still shows but little signs of revival, at least with the "starts and bounds" of a few years ago. Foreign countries are quickly developing their vast resources of wealth in cheap raw material, and cheap labour, which, combined with the facilities of steam transit, enables them to flood our markets with manufactured commodities of almost every description at a cheaper rate than they can be produced by us at home. Again, with almost boundless areas of first-rate corn-growing land, for which the tillers pay little or no rent beyond the rates and taxes of the country, which seldom amount to more than a tithe of an average *rent*, foreign agriculturists are competing successfully with our farmers in every market town in this country. The prospect thus laid before us is certainly not cheering, either to the manufacturer or the agriculturist. Landowners have therefore but little to encourage them in developing the purely agricultural capacities of their property, and must of necessity strike out into other channels for making the most of their land.

On comparing the results of the prices of forest produce during the past year with those realized during the previous four years, we can easily trace the effects of the bad times in the gradual reduction of prices; these are, however, but comparatively slight when compared with the great reductions which have taken place during the same period in the value of agricultural produce, and in the prices of other raw and manufactured articles. This shows that the markets for forest produce are not influenced to the same detrimental extent, by an increasing and cheaper supply of the forest produce imported from foreign countries. The explanation of this is clear. No country in the world has been planting, or even conserving its natural forests beyond the supply required for home demands; and it is an open question if any State has yet, under proper forest conservancy, a sufficient extent of forests to supply all present and future wants within itself. The natural forests of Northern Europe, and North America, from whence it may be said the chief timber supplies of the world are drawn, are being rapidly used up, and the best timber is now only to be found at remote distances from seaports

and other centres of cheap communication with the outer world. This is likely to go on for many years, increasing the difficulty of transit from those remote regions, and thus maintaining higher prices for the produce of our home woods and plantations. No better encouragement can be given to the owners of land, at the present time, to plant extensively all land of less than average quality for agricultural and grazing purposes; and after having planted it, to be careful to see that it is properly and judiciously managed.

In looking to future profits it will be wise not to lay too much value for tanning purposes on the bark of any kind of tree. It is quite evident that science will soon provide materials at a cheaper rate for tanning than oak bark can be profitably supplied at. The production of timber, and other minor produce, exclusive of bark, must now be the chief object of the enterprising forester. A wide field still exists for experiment in realizing the best returns from the minor products of our woods; and here the man of science as well as the practical forester will find abundant scope for intelligent investigation and commercial enterprise. Continental nations have long recognised the importance of this department of forest economics, and annually realize large sums from produce which we habitually neglect and allow to go to waste.

For the first time, through the courtesy of our correspondents, we are enabled to add to our Annual Table a statement of the cost of forest and estate piece-work, and the average rate of day labour in the various districts of the country. We trust that our efforts in this way may be acceptable to our readers, and that the information we have been able to lay before them will prove useful to many of them in their daily avocations.

We have taken every care to render these tables as accurate and fair as possible; but with varying markets, and the innumerable objects that in every district influence the price of forest produce, it is impossible to do more, in many instances, than to draw a fair average of rates. In doing this we hope to receive the hearty co-operation of all interested in the subject, and trust that in the course of the ensuing year many more of our readers will resolve to aid us with the necessary information, so that our Annual Tables may be largely extended, and rendered still more useful to themselves and all others interested in the success of our forests.







ENGLAND.

COMplete the harvesting and delivery of bark as quickly as possible and remove the timber and tops from the falls. Cold north and east winds have again delayed the work of stripping as in former years, and throughout the early part of May but little progress could be made in exposed places and upon cold, wet lands. Prices of bark again rule low, and £4 10s. per ton in the yard or upon rail may be taken as somewhat above the average for this district.

After the long dry season we have had, and the occasional high winds which have prevailed, many trees will require a good treading or well ramming up. Large trees intended for future removal should now be opened out and have trenches cut round them at distances proportioned to their size, such trenches being afterwards refilled with a good compost.

Commence pruning towards the end of June, cutting off all branches in such a manner that no water shall lodge upon the surface. Plantations which have been heavily thinned should not be pruned the same season, as such treatment is generally found to be too severe for the standards. Exposure should in all cases be gradual. Though branches may be foreshortened at the time a tree is removed, no close pruning should take place either immediately before or shortly after transplanting. Trees which have received proper attention in their youth will seldom require much pruning after they have stood twenty years. Where large branches have to be removed, strips of the bark may be taken from the branches, though not detached from the tree, and folded carefully across the wound and fastened down; or a dressing of cow-dung and a little lime will hasten the formation of a covering of bark.

In the nursery uncover all seed-beds, watering and weeding where necessary. Continue to hoe and dig in the lines, plant out small evergreens, bud hollies, and loosen the bandages around grafts. By the end of the month elm seeds may be collected and sown at once. The soil for such should be fine and mellow and the covering light. Side-prune young trees, leaving them a fair size of head.

Hoe and clean hawthorn and other hedges, and trim up those of privet and gorse. Rambling fences or screens of elder may also be now headed down.

The clean culture of green crops upon nursery plots will prove the best possible preparation for future crops of seedlings. Constant hoeing until such time as the plants thoroughly cover the ground should be made the rule in all cases.

Trenching or deep steam cultivation of heavy land intended for future plantations cannot be undertaken too early in the season. The complete aëration of the soil which follows an early summer cultivation is invaluable as a preparation for a stiff clay soil.

Pluckley, Kent.

A. J. BURROWS.

SCOTLAND.

BARKING operations will now be, generally, in an advanced state. Push on the same vigorously and have the peeling completed by the time the leaf is fully expanded. Pay every attention to the drying and storing of the bark. It would very much hasten the harvesting, if the tree bark were dried in ranges apart from that of the branches and coppice. Should this be done, I would advise the procuring of a number of light canvas covers—which should be oiled so as to make them the more thoroughly waterproof and durable—with which to cover the ranges of small bark. It would only be necessary to provide as many covers as would protect—when raining—those ranges that are partially dry, after which the bark is more apt to get damaged. The covers should be about three feet wide, and of any convenient length. The writer has used these for some years, and found them of great advantage.

Look over ornamental *coniferæ*, and pinch off or disbud all contending leaders and strong lateral shoots. Attend to young plantations, in the way of preventing ferns or other rank herbage from interfering with the growth of the plants.

Should the weather be hot and dry, still attend to the watering of trees and shrubs transplanted late in the spring.

Look over all plantation fences occasionally, and always have them in a good state so as to resist the inroads of stock. Tar, varnish, or paint wood and iron fences. Before doing so, all grass and weeds should be cleaned from under them. Apply the coating thoroughly at and near the surface of the ground.

Fence, drain, and prepare ground for next season's planting.

Attend to the killing of weeds in the nursery, always keeping them down, so as to prevent them from shedding their seed.

Turn compost heaps; clean policy roads and walks.

All noxious weeds immediately inside plantation fences, or in the line of the same, near the policies, or where arable land adjoins, should be cut and kept down.

Darnaway, N. B.

D. SCOTT.

IRELAND.

THE continuance of fine weather during the past month has facilitated the completion of oak stripping. Those who began early have been favoured with a fine bark harvest, and no time ought to be lost in getting all the bark put into a rick. Collect all the fagots into heaps and have them either sold or burned, so as to have the ground cleared before the copse begins to grow. All drains in the newly-cut portion should be cleaned, and new drains opened where required.

This is a good time to clear out wet dikes and wood drains generally. Advantage should also be taken of the present dry weather to repair river sides, and open out obstructions in beds of running streams. "A stitch in time saves nine," is a good motto for all having an interest in the protection of land situated alongside rapid rivers.

Towards the end of the month go over newly planted ground, and cut away from the small plants all vegetation likely to interfere with their growth. This is a very essential work, and ought never under any circumstance to be neglected.

All out-door wood-work ought to receive a coat of paint once a year at least. The present month will be found highly favourable for such work, whether paint or common tar be used.

Repairs of all kinds should be proceeded with as time will permit.

Ballinacourte, Tipperary.

D. SYM SCOTT.

WALES.

WHERE the stripping of oak bark has not been finished it ought to be drawn to a close as soon as possible. We have already finished, and on the whole the season has been a good one, although we had a prevalence of dry weather and cold winds; the bark was running in many cases better than could have been expected. As the bark becomes properly harvested it should be put into stacks or sheds, to secure it in good condition for delivery. Wherever it has been sold it should be delivered as soon as convenient, taking care to select good dry weather for the work. As the oak stools will soon throw up young shoots, the timber should be dressed up, and removed from the interior of the plantation as soon as possible. If the branches are intended for firewood they should be removed, or corded up for sale.

Hardwood trees may now be pruned with advantage, an operation that may be performed as the men are relieved from barking. Where branches have been shortened at a previous pruning, they may now be removed close to the stem.

Clean young hedges by hoeing or light digging, and remove all

grass and other herbage from the roots of the plants, so as to admit plenty of light and air. Varnish or tar all iron or wood fencing where necessary, during dry and warm weather. Any rust or blisters on iron or wire fencing should be removed before painting.

Clear out open ditches while the water is low, and put fences and tree guards in good repair. Remove and transplant evergreen trees and shrubs with good balls of earth, and give them plenty of water at the time of planting, and after as occasion requires. If the plants have been previously prepared for removal the chances of success will be greater. It will also be necessary to have them secured by staking or moorings to prevent them being swayed by the wind.

Where gorse, ferns, or other strong herbage shows signs of choking young trees in new plantations, it should be cleared round the plants. In exposed situations it is advisable to leave as much shelter between the plants as possible to protect them from cold winds without interfering with the plants. Keep the hoes going in the nursery, and clean shrubbery and other borders, also walks and carriage drives, &c.

Kimmel Park.

LEWIS BAYNE.

AN OLD SCOTTISH SCHOOLMASTER ON SILVICULTURE.

THE Scottish schoolmaster of the olden time was no unimportant character. He was generally a man of strong, gnarly personality, stout of heart, strong in mind, doughty and dignified, quaint, cultured, simple and enthusiastic. There was, indeed, not seldom, a sort of twist in his life. He had gone half-way, or it might be farther, on his way to ministry in the Church, and was often actually in what one might call "holy orders"—being, as it is called in Scotland, "licensed to preach;" or he had been seized with the sacred thirst for scholarship, and had an eye to one day holding a professor's chair; or he had been unable to find a vocation in life suitable to his taste or whims, and betook himself to the ferule till something else might—but never did—turn up; or he had been "crazed with care or crossed in hapless love;" or he had suffered injury in limb or fortune; or his ambition had been thwarted, and disappointment had soured him; or he was bashful and unpushing, and could not make his way among the more stirring, bustling, self-seeking competitors; or "stern poverty's unconquerable bar" had kept him from reaching other havens of rest where he might anchor than a parish school. But he was always a scholar, a man of influence, a character, and an important person, and not unfrequently the master of the parish in minor secular matters, the general umpire in

disputes, and adviser in their difficulties of the farmers and labourers among whom he dwelt. His position was in some respects a curious one.

The order of things in Scotland tended much in early times to make the Schoolmaster a marked, as he was often a remarkable man. He was not a tenant at will, but held his office and received its emoluments during life—unless he were legally convicted of some crime or gross misdemeanour. His salary was paid half-yearly at fixed terms by the landowners; he had a house with garden-ground, cow's grass, and often some farm-land attached, and he had a right to certain payments per child in money or in kind. These, with the small additions to his income gained from other sources, made him securely independent in the poor fashion of his profession. On his appointment it might be said he adopted the parish, and the parish adopted him, and they settled down to make the best of their "lang-fee" relationship. Laird, minister, farmer, cotter, labourer, mechanic, and ploughman or herd, with their wives and families (if they had any), took to him as a necessary part of their parochial society, and he tried to adapt himself to his surroundings as well as he could. Of course his main duty—as it was the chief reason of his being there—was to teach the children within the bounds, the entire round of the education which a Scottish parish schoolmaster was expected to impart, from the initiatory learning of the letters to the study of such classics, mathematics, French, &c., as might qualify the pupils for mercantile, agricultural, or university life; besides such a drilling in systematic theology as the Presbytery thought proper to demand. Owing to his lordship, as it were, over the children, and the common masterfulness of his manner, his moderate life-rent, independence, and his activity in parish concerns, he was usually good-humouredly greeted as "The Dominie," from Latin *Dominus*, a lord or master.

The Parliament of George III. did them no more than justice when, taking a review of the services of these men during the preceding century, they said: "the Parish Schoolmasters in Scotland are a most useful body of men, and their labours have been of essential importance to the public welfare." One great reason of their usefulness and importance was, as we think, the care that was taken to make their interest in their parishes a living and constant one, so that they had good reason for giving a hearty and sincere attention to anything that might increase the prosperity of the parish and of working not as merely hirelings for, but as being personally incorporated among, the proprietary and the families of the parish.

In the case of a recent book-hunting expedition—for I dearly love a rummage through the stores of a bibliopole who is up to his business—I came quite unexpectedly on a small book, now become

pretty scarce, which affords some glimpses of schoolmasterly life in Mid-Lothian about a hundred and fifty years ago, and supplies us with some information regarding timber-culture in Scotland in the interval between the two rebellions, 1715—1745. The title of the book runs thus: "*Virgil's PASTORALS*, Translated into *English Prose*; as also His *GEORGICS*, with such *Notes* and *Reflexions* as make him appear to have wrote like an *excellent Farmer*. To which is added, An Appendix, showing *Scotland's* chief and principal Worldly Interest. By James Hamilton, Schoolmaster in East Calder. Edinburgh: Printed by W. Cheyne, in Craig's Close, opposite to the Cross. Sold by J. Traill and G. Crawford, Booksellers in the Parliament Close; and by J. Barry, Bookseller in Glasgow. 1743."

The book is a small, well-printed 18mo., published at two shillings, containing sixteen pages of dedication, preface, &c. The translation of the ten *Bucolics* or *Pastorals* occupies thirty-five pages. The four *Georgics*, with a few remarks at the end of each, and some notes inserted in italics throughout the text, carry us on to p. 135. Thereafter, with new pagination, begins the "Appendix to the *Georgics*," extending to sixty pages. The amount of thought on national prosperity, the intercourse of nations, the relations of commerce, manufactures, and agriculture, the education of children and the culture of the people, on leases and rent, on necessities and luxuries, on the principles of husbandry and on forestry, is singular and sound. He had apparently conciliated a good deal of favour for his aims, as among his subscribers are his neighbour schoolmasters, the clergy in the surrounding parishes, many of the noblemen and landed proprietors of the country, and of the tenant-farmers; while merchants, lawyers, and senators have not disdained to lend him countenance.

East Calder was a parish (since incorporated—in 1750—with Kirk-Newton) in Mid-Lothian, about ten miles from Edinburgh. Its population would be about one thousand, and entirely rural. There were sixty-three carucates or ploughgates of land under culture in the parish, but there were few natural woods, though some part of Hatton Park was within its bounds.

Of the author of this book we have been able to learn nothing, after extensive search, except the autobiographic hints which are scattered here and there through its pages. That he was a scholarly person, though perhaps not trained at a university, we know, not only from his position as a schoolmaster, examined and found sufficient by the Presbytery of Linlithgow; but from his acquaintance with the Roman *Scriptores Rei Rusticæ*—writers on rural affairs, shown in this prose translation of the rural poetry of Virgil, and in his proposal to publish Extracts from the *Work on Farming* which Lucius Junius Moderatus Columella, of Cadiz, in the time of the Emperor Claudius.

41-54 A.D., wrote in emulative rivalry of the Mantuan in the Augustan era, and from the prose Treatise on Agriculture (*De Re Rustica*) due to the pen of the Tusculan Cato. He had also planned a new edition of Virgil's *Æneid* with several new features, though he was acquainted with the versions of Dr. Trapp, the Earl of Lauderdale, and John Dryden. He shows, besides, some knowledge of Ovid and Statius. His reading on agriculture included Jethro Tull's "*System of Husbandry*," 1731; John Mortimer's "*Treatise on Husbandry*," 1736; Thomas Hope of Rankeillor's "*Treatise on Fallowing Grounds on Grass Seeds*;" "*The Transactions of the Society for the Improving of Agriculture in North Britain*," &c. His information on other subjects and in other respects, is highly creditable. His remarks on political economy, the course of trade, manufactures and commerce, land-leases, the duties of landlord and tenant, education, modes of husbandry, the benefits of planting, &c., are shrewd, advanced, and sensible.

I guess that at the time of issuing this book he would be about forty-six. He had then been upwards of twelve years a schoolmaster, and he had lived in South Britain for fully ten years. He was married too, and had apparently suffered losses, for, speaking of 1740, he says, "my family consisted then of seven." He complains several times of his narrow circumstances, and seems to hint at his own condition when he expresses the opinion that schoolmasters "ought to have a sufficient collection of the best books for their assistance, which a man cannot be supposed able to provide whose yearly income does not exceed ten or fifteen pounds" (p. 51), and speaks of their having "forty, fifty, yea some eighty, scholars to be instructed in different pieces of education" (p. 52). He had "travelled the greatest part of Britain" (p. 33), he says, though he does not inform us in what capacity. I have a sort of feeling that he "was out" in 1715. In this passage we have a glimpse of him on his travels:—"Yorkshire is one of the best counties in England; yet there you may travel many miles upon sandy and gravelly ground. About Tuxford you find such stiff clay that in winter the road is scarce passable. In Lincolnshire, on that account, in that season, for several days, on horseback, I could, with difficulty, ride twelve miles a day, and sometimes have been obliged to hire one to lead my horse, the roads being so deep and the clay so stiff. What has the greatest part of this shire formerly been but a fen? What ground more moorish than Windsor forest? What more barren than Hounslow and Blackheath? though not far distant from the metropolis. I need not mention Northumberland, Cumberland, Westmoreland and numberless places, which owe their fertility to the laborious inhabitants" (p. 7). "In Middlesex, Surrey, and some other places not far from London, they never suffer

their ground to lye without a crop in summer" (p. 14). He tells us, in regard to certain statements about manure, "in England, particularly Herefordshire, this or the like is practised" (p. 41). "I have frequently seen a man allowed half of what he plucked of plums and cherries for his trouble, and yet in some years, in Kent, &c., the greatest parts of their fruits are supposed to wither on the trees" (p. 54). "The best haymakers, in my opinion, are about Islington and Highgate; there I have helped to make hay fit for the stack in the evening, which was cut down early in the morning of the same day" (Preface, xi). "In England, sometimes I have known wheat sown in August" (p. 45). Some on reading these extracts may be inclined to think James Hamilton was an Englishman; but that he was a Scotchman, is plain from his statement that his book was written out of "real love to the place of my nativity" (p. 48).

One of the main interests of the book for the readers of the *Journal of Forestry* lies in the fact that, speaking to the landlords and tenant-farmers of Scotland, he endeavoured to rouse them to a sense of the advantages which would arise from the union of husbandry and tree-planting, and from the earnestness with which he presses on them the exercise of observation and common sense in their vocation.

It is to be recollected that this work was written when the fortunes of Scotland were at their lowest ebb—in the transition-time between two Scottish rebellions. The Union had not produced the peace, prosperity, and contentment which patriots and prophets had promised. Poverty's heavy hand lay on the country. "Many farms," he says, "pay the proprietor only sixpence per acre, which I dare affirm might enrich the tenant if well cultivated, though he paid for some of the best above-mentioned a crown, yea, ten shillings yearly," and he proposes to help towards this end by suggesting to proprietors for consideration, "whether it may be useful to settle men of good taste in farms in different places in the country, lending them money by degrees; that these should be under the inspection of sufficient judges of husbandry; . . . that they should show an example to their neighbours, not only by hedging and ditching, but also by dunging of grass, sowing grass-seeds, making cheeses after the English fashion, breeding hogs, sheep, cows of the largest sizes, sowing turnips, parsnips, carrots, planting potatoes and fruit trees, and at length of making cyder and perry" (p. 57).

Perhaps I should now proceed to show what Hamilton's views on silviculture were. Of course, it is known to our readers that the Georgics of Virgil were composed with the patriotic purpose of supplying the veterans who had been disbanded after the civil wars, and had been made proprietors of certain assigned lands in Italy, with an elementary work on Husbandry which would awaken within

them a taste for the new occupation which would require their care, and to inspire them with zeal in the employments of rural life. The theme of the First Book is "Cereal Crops;" that of the Second "Forest Trees;" of the Third, the "Rearing of Cattle;" of the Fourth, the "Management of Bees." In his Dedication, the author remarks:—"Knowing that Virgil's works are put into the hands of the principal hope of the age, the children of such as are most capable to bestow such a stock upon them, as, if well improven, may tend to their own happiness, and to render them public blessings; I say, sensible of this, I know not how to serve my country better than by publishing the following thoughts upon Husbandry; which I hope may beget an inclination in such youth, who are most capable of improving in Agriculture, to make it their business to do so" (p. vi.). Again, in his Preface, he says: "I may venture to affirm that the world owes the principles of Agriculture more to Virgil than any who have wrote thereupon for many ages bye-past. I have published his Georgicks with such reflections as I hope may be of use to some of my readers." "I have endeavoured to be useful to the studious youth, not by a paraphrase, but a translation" (p. x.).

It is in the remarks connected with the Second Book of the Georgics that James Hamilton's views on Silviculture occur; and perhaps it would be just to let him be heard as a prose translator of Virgil's artistic verse. "First of all, Nature doth vary in propagating trees; for some of them grow of their own accord, no man forcing them, and overspread fields and the banks of winding rivers, as the tender osier and the flexile broom, the poplar and the white willow with its grey leaf.* Some rise from seed thrown into the ground, as the lofty chestnut and the beech—which being biggest in the woods puts forth its leaves in honour of Jupiter—and the oaks, esteemed oracular by the Greeks. A thick grove springs from the roots of others, as the cherry and the elm; also the little Parnass-born bay, sprouts up under the very broad shade of its mother. Nature, at first, appointed these *three* ways; by these every kind of woods, and shrubs, and sacred groves, bloom. There are other methods which experience has found out by a tract of reasoning. One slipping off shoots from the tender trunk of their mother sets them in furrows; another buries *fibrous* stocks in mould, and standils split in four, and stakes cut sharp. Some other trees want to have the branches for propagation, bended archways, and the shoots living in their native mould [*i.e.*, the branches bended down from the tree, and covered with earth, take a great number of roots, and send forth shoots, which branches being cut about 3 in. distant

* Compare: "There is a willow grows salant a brook
That shows his hoar leaves in the glassy stream."—*Hamlet*, IV., vii., 167, 168.

each shoot may be planted]. Others need no root, and the pruner doth not fear to plant a scion from the top of the bough, restoring it to the earth *from which it originally came*. Besides (wondrous to relate!) new roots from the olive are emitted from the dry wood, the stock being split in pieces; and we often see the grafts of one tree change to the branches of another without any damage, and the pear-tree transformed into ingrafted apples, and the stony cornels blush into plums." Thus it is that he speaks as the interpreter of the Forester's Song of the antique time. Elsewhere we have him in his own person exhorting the "proprietors of our land estates" to employ "themselves in Husbandry," not "to build walls to exclude yourselves from your own lands, or keep a number of fine brutes to devour the provision of your ladies and children, when here you may be employed with pleasure and profit, advance to further degrees of grandeur, render your names savoury to posterity, and shew yourselves true patriots" (p. 47). After inveighing against keeping too great a train of servants, advising the selecting of good tenants with long leases, he continues:—"I humbly am of opinion, that by such means you may render yourselves a blessing to your country, increase the value of your lands, add to your own pleasure, even by beholding much of your own properties reduced from a barren wilderness of a dismal aspect, which frequently filled your mind with gloomy thoughts to a fruitful field adorned with trees, beautified with flowers and fragrant grass, enriched with herbs and corn, surrounded with hedges, the habitation of birds warbling forth their melodious notes, and, in short, make your estates an abstract of all the beauties of Nature and Art" (p. 49).

After advising the adoption of a system of well-devised premiums as encouragements to the furtherance of needed experiments, he says: "Why may not a gentleman plant walnut trees in his hedges, in place of ashes, when he is sure of a premium and finer wood? What hinders from planting quinces on wet cold ground, or dividing and subdividing large enclosures by fruit trees, which are as easily planted as barren ones, when a man is sure, if he misses fruit, he shall have a premium per hundred, for so doing?" (p. 57).

In combating the opinion that "much of our country is mountainous; and we want Orpheus' harp to cause mountains and woods to follow us; some of it is so remote from seas and rivers that it cannot be of much use to the proprietor, by far, as if otherwise situated," our author suggests, "that our hills and mountains if planted with trees, would not only furnish us in much timber fit for our own use, but supply our neighbours, whereby considerable returns would be made to help to enrich the nation. I have seen in the highlands, firs forcing their way into the seams of rocks

where I could observe no earth to nourish them ; a noble pattern and example of industry to the inhabitants. This shows our encouragement to plant " (p. 4).

In advocating enclosing, he says : " In England they are so sensible of the great advantages of enclosing that the greatest part of their country appears like a garden being fenced by hedges of thorns and other quicks, which are by far preferable to dead fences or stone-walls." . . . " We want fuel for fire in many shires, which hedges would supply in great plenty. The advantages of wood ashes are not inconsiderable, as being good for pasture and corn fields ; these would be of great use where limestone is scarce, there being much salt in the ashes of all trees, aquatics excepted. The ashes of ash and thorn, especially the former when chemically prepared are great caustics ; this I know by experience. By the want of wood ashes many thousand pounds are sent yearly to our neighbours, for potashes, soap and glasses " (p. 11). . . Draining, fencing and enclosing of ground, are not only themselves an improvement thereof, but lay a foundation for other improvements—such as the planting of fruit trees." . . . " Thorns are the best fence. To plant them on the face of your bank is better than in one row." . . . " Thorns agree with a rich gravelly or sandy soil. Mossy and wet grounds require aquatics, such as willows, alders, French osiers (p. 16). " To make your hedges soon sensible, lay a row of hog's-dung on the top of your bank, the substance whereof washen into the earth below will forward it wonderfully " (p. 17). . . " If you find a good mould below moss, throw it up for your plantation, suffering it to lie for some time, to be prepared for your thorns by the sun and air " (p. 18).

Here is a passage which shows that Hamilton was not a mere theorist in Silviculture :—" What I look upon as the best method for planting is first to take virgin earth, and mix it with fat dung, turning over this mixture at different times, till both be incorporated ; this may lie two years. The ground having been trenched which you design to plant, dig a hole or pit, into which throw some of the above compost, upon which plant your tree, spreading fat dung over its roots. I would not have fruit trees planted deep, because the best earth is near the surface ; in wet, stiff clays, plant only six inches deep ; lay two tiles or three bricks below the roots of all fruit trees, except pears, and cover after the dung with the compost I mentioned " (p. 72).

Such are a few excerpts from this rare little book, which seem to prove that James Hamilton was an intelligent man, a scholarly schoolmaster, a keen observer, an independent thinker, a patriotic Scotsman, a fair farmer, a wise adviser, an enterprising and adventurous seeker after new and better things, and one of the early pioneers in the

improvement of Scottish Forestry. There seems no reason to doubt that the little book, of which we have been speaking, had a fair measure of success. He had submitted the Appendix to "the Society for Improving in the Knowledge of Agriculture in North Britain;" it was approved by them, and he was allowed to dictate the book to them. He had secured an influential list of subscribers, which included many of the most active and earnest improvers of tillage in Scotland. His design was, by the sale of 2,000 copies of it, to gain the means of betaking himself to a farm; his "ambition being to show a specimen of good husbandry," and having provided himself with ploughs and a ploughman from Hertfordshire, to "teach a set number from different Shires in Scotland" upon this model farm. Though there is no ground for supposing that he did not get his work fairly sold, it is to be feared that "the Hamiltonian system of Agriculture," which he designed, was never carried out. Scotland was getting into a disturbed state about that time, and it is probable, as we hear no more of it or him, that in the Rebellion of 1745, the scheme of this enthusiastic, experimental, philosophic founder of a practical School of Husbandry, failed.

S. NEIL.

CONIFERS ON THE PRAIRIES.

MR. JAMES T. ALLAN, of Omaha, Nebraska, U.S., lately contributed the following interesting remarks on the planting of Conifer in the prairies to *The Garden* :—

"In a recent number of *The Garden* I noticed a reference to the *Picea pungens*, known as the Silver spruce in the Rocky Mountains. As you say, truly this is a most beautiful tree, and may justly be said to stand foremost among the mountain conifers for its symmetry and the beauty of its foliage. This tree grows on what are known as the "foot-hills" in conjunction with the Douglas fir, preferring the borders of streams. *Picea Engelmanni* is also found in the same localities at an elevation of from 6,000 ft. to 7,000 ft., but the Douglas fir is found still higher. *Picea pungens* is a very stately tree when it reaches a height of 150 ft. When 50 ft. high, standing by itself with room to display its perfectly symmetrical shape, stiff horizontal branches extending 20 ft. from the trunk, the lower ones sweeping the ground, covered with rich foliage which glistens like silver under the of the morning sun, it is a grand object for a lawn or large plantation. There are two varieties, only differing in colour, one being glaucous and the other entirely green, darker than the Douglas fir. A few years ago, while procuring a car-load of these trees, one of the sudden showers incident to that region forced us to shelter, and cutting an opening through the branches we found a natural tent more than 80 ft. in diameter. Here we cooked and ate our dinner, and found when we came out that the ground was white with

1 in. of snow, which had fallen so silently unknown to us in our secure retreat. More than once I have found such places in the summer time very agreeable to spend the night, with blanket spread on the thick bed of fallen leaves, and the air laden with the pleasing resinous fragrance. Storms of sleet and ice never break down these stalwart trees. I have found no difficulty in transplanting these varieties from that high altitude to one 4,000 ft. lower, where they have made a satisfactory growth. During last May I moved several hundreds 1½ ft. to 4 ft. in height with a loss of only 10 per cent., and the season was the driest we have had for years.

"An article a few years ago in the *Journal of Forestry* advocated the planting of the Douglas fir in conjunction with the Larch. The foliage of the Douglas fir is not as dense as that of *Picea pungens*, of a light green, with branches inclined to droop. The tree attains a large size on the Pacific coast, and furnishes a great amount of the timber for export to Asia, known there as the Yellow fir. The forests of the eastern and central regions of the United States have been of late years so extensively cut away that the only heavy timbered tracts are in the north-west, and these will soon be invaded by railways. With a possibility of a future timber famine, increased attention is being called to replanting forests, and planting of large tracts on the bare prairies where but few trees exist. I have had no difficulty in transplanting any of the Spruce family, they having more fibrous roots than the pines.

"Another splendid tree, *Abies grandis*, deserves special mention. It is tall and imposing, has strong stiff branches in regular whorls, and leaves dark-green above and glaucous below. I have often noticed, where the trees had a chance to spread their branches, the lower ones with their heavy foliage drooped to the ground, there would be a cordon of young trees of from 10 ft. to 12 ft. in height which had taken root from the branches of the parent. The wood is soft, very white, eminently adapted for beautiful inside finishing. And here, let me say, that the American people are largely using our woods for finishing their dwellings, from pantry to drawing-rooms, while the railway-car builders are finishing their elegant day, sleeping, and dining carriages with alternate panels of American woods, showing Nature's beauty undefaced by paint.

"Returning to our Rocky Mountain conifers, the *Picea Engelmanni* is another grand variety, the most alpine of all the spruces being often found at an altitude of 10,000 ft. In lower altitudes it reaches a height of 100 ft., very pyramidal, and beautifully glaucous. The wood is white, soft, easily worked, and valuable.

"Of the Pine family, *Pinus ponderosa* stands justly at the head as a timber tree. It is called by the mountain men Black pine. Its dense, deep green, massive foliage strongly resembles that of the Austrian pine. By all it is acknowledged as the grandest of North American pines, and called "Yellow pine," on the Pacific coast, where it abounds. *Pinus flexilis*, a five-leaved pine, also seeks a high elevation, but does not grow to the great size of *P. ponderosa*; still it is a beautiful ornamental tree. *Pinus contorta* (twisted one) does not grow to more than 40 ft. or 50 ft. in height, but its peculiarly

fine, light-green foliage makes it an excellent lawn tree in contrast with darker-leaved kinds.

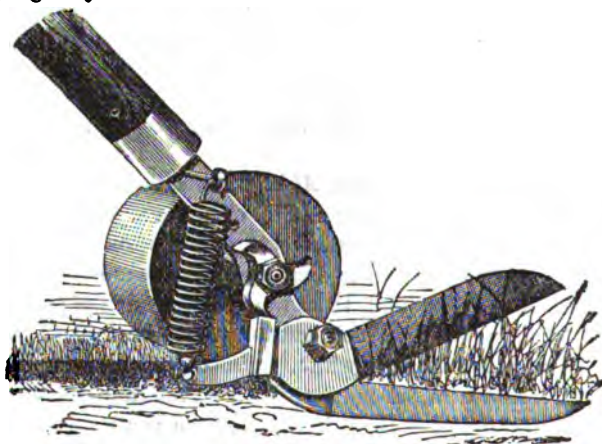
"*Juniperus cærulea*, with very bright silver foliage; *J. occidentalis aurea*, golden tipped; and *J. prostrata*, which has a bright lemon-yellow colour in winter, are all beautiful trees for lawns or plantations.

"We have gone back to the old nomenclature of Europe, substituting *Picea* for *Abies*. This has been brought about by Dr. Engelmann, of St. Louis, the best authority on conifers on this continent."

ADIE'S PATENT LAWN EDGER.

WE have had pleasure in practically testing a specimen of this very useful and clever little machine, which under certain conditions does its work uncommonly well, and effects a great saving of time and labour. The conditions to which we refer are simply that the edgings on which it is used should be tolerably well kept; if the edges are very irregular or jagged, a good job cannot be made of them all at once.

From the above illustration it will be seen that in use the lower blade should be pressed firmly against the edge to be trimmed, and a slight downward pressure put on the roller which runs on the grass, the point of the under blade being kept slightly under the surface (about half an inch). The machine being now



ADIE'S PATENT LAWN EDGER.

propelled well in line with the edge, will help to regulate the face of the turf, as well as to remove the over-hanging grass. The bottom of the lower blade should not be allowed to press hard on the gravel, as it thus takes off revolving power from the roller. The axle and shear bolt should be oiled from time to time, and the cam teeth greased or oiled also.

In rescrewing the blades, after sharpening, do not let them rub each other, as a slight shake is better, the slant on the spring keeping them together.

The springs are supplied for different strengths of grass; two of these may be used at one time (*i.e.*, side by side) where the grass edges are rough, and a tray added, when required, whereby sweeping afterwards may be dispensed with.

It leaves a strong edge at the top of the verge well bound together, as it does not cut away any portion of the roots; and in cases where very strong verges are wanted can be made capable of cutting grass growing on the upright face of the verge 1½ or 2 in. deep.

The price is 25s., and the machine will very soon save its cost in labour alone.



WE learn from the report for the official year, 1879-80, of the Forest Department, in the Bombay Presidency, which has just appeared, that during the year the Forest Act of 1878 was brought into force chiefly by the influence of the late Governor, and a large area was added to the forest reserves. There are now close on 15,000 square miles of territory, divided into reserved and protected forests. Over the reserved portion the Forest Department has complete control, but certain rights are allowed over the area called protected. An officer in each forest district called a settlement officer was also appointed to settle all claims and questions of right.

Fire still seems to give great trouble, and no means have at present been found to combat this great enemy of forest growth. It is, however, satisfactory to notice that the apathy which in former days characterized any attempts at preventing the yearly hot-weather fires of the forest region has disappeared. During the year the revenue has made a great bound towards a return to the prosperous days before the famine; and although more superior officers have been employed, the expenses have been less than the estimates for the increased supervision. Several useful maps are issued with the report. Altogether considerable progress seems to have been made during the year in forest conservancy throughout the Presidency.

The manner in which the Government met the proposition of Sir Massey Lopes for the appointment of a Minister of Agriculture, is a guarantee that the farming interest is likely to receive its full share of attention from those now in office. American agriculture owes much of its success to the efficiency of this department. The copious reports issued annually, are eagerly sought for and carefully read; and the mother country may well take a lesson upon this subject from our trans-Atlantic cousins.

At the recent meeting of the Botanical Society of Edinburgh, Dr. Cleghorn showed that in this country, as well as in Spain and the south of France, the broom, which has been hitherto regarded as a mere bush, may attain a timber-like size, when it is useful for veneering purposes, by exhibiting a broom stem 12 ft. long and 8 in. in diameter at one foot from the base, cut down, just before the meeting, on his estate of Stravithie, near St. Andrews. It had been planted in poor sandy soil, in 1870.—Mr. M. Dunn congratulated such a veteran forester as Dr. Cleghorn in having opened a new economic path for Scottish arboriculturists.

In Perthshire, and neighbouring counties, we understand that the larch and Douglas pines are this year heavily laden with cones, so that should the weather prove favourable for ripening we may anticipate a

plentiful supply of seeds of these valuable trees.

* *

In the north-eastern counties of Scotland great difficulty is experienced in disposing of home-grown timber at profitable prices, more especially in the larger sizes and superior qualities, and on many estates we learn that only wind-fallen trees and just what was necessary to keep the plantations tidy has been sold.

* *

Mr. Francis Geo. Heath, who is always on the *qui vive* to protect the few sylvan beauties which still remain in the vicinity of the metropolis, has lately called attention in the newspapers to the fact that the beautifully-wooded eyot above Kew Bridge, on the Thames, is being rapidly destroyed by the tide. Mr. Heath appeals to the Commissioners of Woods, who are the owners, to do something to preserve this pretty Thames picture, and we hope his request will not be allowed to pass unheeded.

* *

The unfortunate litigation which has recently been carried on between Earl de la Warr and others concerning certain alleged rights in Ashdown Forest, has given rise to a great deal of bad feeling in the neighbourhood, and during the last two months the forest has been on fire several times. On the 14th ult. the largest of these conflagrations occurred, when between twenty and thirty acres were burned, the fire extending over half a mile in length. Numbers of people turned out to watch the flames, but no one offered help to extinguish them, much animosity being shown to the lord of the manor.

* *

It is with much regret that we record the death of Mr. Toward, who was for thirty-nine years land steward at Osborne to the Queen and Prince Consort, by whom his

long and faithful services were highly valued. He had, under the direction of the Prince Consort, executed the entire laying out of the grounds, gardens, roads, and plantations at Osborne. Mr. Toward was universally respected, and died in his 87th year at Amherst Lodge, Carisbrook, where her Majesty had repeatedly visited him, and saw him last two days before she left Osborne.

* *

Many of our readers will learn with regret of the death of the eminent arboriculturist, Mr. J. Grigor, which took place at the Nurseries, Forres, N.B., after a short illness, [on the 14th ult. It is perhaps on the authorship of that admirable text-book, "Arboriculture," the second edition of which is noticed this month in our "Review" columns, that Mr. Grigor's reputation chiefly rests, and although he was the author of other writings on rural subjects, the valuable aid which the work referred to has rendered to foresters and planters, generally, will long cause Mr. Grigor's name to be held in thankful remembrance.

* *

Our obituary notices this month are painfully numerous, but we cannot refrain from a brief expression of the sorrow with which the announcement of the sudden death of the Right Hon. W. P. Adam, Governor of Madras, which took place on May 24th, must have been heard by many of our readers, and more especially by the members of the Scottish Arboricultural Society, of which Mr. Adam was ex-president. It is only eighteen months ago (Oct. 7th, 1879), that we, in common with a large gathering of the members of this Society, had the pleasure of listening to the admirably practical and inspiring address which the Right Hon. gentleman delivered on the occasion of his vacating the

Presidential chair, and it is the remembrance of the active vigour and extraordinary energy which then seemed to possess him, that causes the news of his untimely decease to be the more deeply felt.

* *

It somewhat strange that in the light of recent experiences people should still persist, even in the most sheltered and favourable parts of the country, in planting the *Eucalyptus* in the open air with an idea that the trees will not only survive the severe frosts with which this country is visited, but that they will grow with the grace and vigour which is so characteristic of these trees in climates really suited to them. The following note from an American exchange should be the *coup-de-grace* for such adventurous spirits:—"Trees of *Eucalyptus* nearly thirty feet high have been killed in Florida during the past winter."

* *

It is with much pleasure that we call attention to the letter printed this month in the "Editor's Box," from Col. Pearson, the officer in charge of the forest students at the School of Forestry, Nancy, France. Col. Pearson expresses his entire sympathy with the efforts we have long been and are still making for obtaining the home education of Indian Forest officers. We think it a great argument in favour of a British School of Forestry, that Col. Pearson, than whom no one can possibly have better opportunities for judging, regards the present system of Continental training as only a make-shift, until such time as the proper facilities can be obtained at home.

* *

The charming scenery and interesting associations of the Forest of Dean are far from being recognised as they

ought, chiefly from the want of some means of introducing them to the notice of the public. A Guide-book is, we hear, about to be issued to supply this want, the object of which is to describe a series of day excursions, taking the Speech House as a centre.

* *

Mr. P. Grieve, of Bury St. Edmunds, has sent us a capital photograph of a very beautiful specimen of the wych elm (*Ulmus montana*), growing by the side of the Farnham Road, Bury St. Edmunds. There is, as far as is known, no present prospect of this lovely tree being cut down, but Mr. Grieve hopes that by drawing public attention to it it may be preserved, and not sacrificed to the greed of any speculative builder.

* *

The garden which, two years ago, was laid out in St. Paul's Churchyard, is just now looking about as miserable a specimen of vegetation as can be well imagined. Whether this arises from the unseasonable time of year at which most of the trees and shrubs were planted, or from the work being imperfectly done at the commencement, or from subsequent neglect, it is difficult to say; but it is certainly a disgrace that our lovely metropolitan cathedral should be surrounded by such a mass of dead and dying vegetation.

* *

A pleasing and useful custom has lately arisen in some of the American States of setting apart one day in the year to the duty of tree-planting. The 28th day of April was "arbor day" in the State of Michigan, and we understand that a very large number of trees were planted, and that much interest was shown in the occasion.



THE VALUATION AND MEASUREMENT OF TIMBER.

SIR,—The friendly criticism by Mr. Daniel Watney constitutes a valuable addendum to my paper on the above subject, which appeared in your last volume, and the object of which was rather to sketch general rules for the guidance of the young forester, or land agent, than to give minute details of practice. I am fully aware that great differences prevail in the various counties of England, and it was mainly on this account that I confined myself as much as possible to generalities. I would therefore add a few remarks to what I have already said on this subject.

(1) In measuring and valuing the timber upon the two large estates in the West of England, which were being offered for sale, my instructions were in the one case to put a "nominal value" upon the ornamental timber, and in the other not to let this exceed two-thirds of the market value. Afterwards upon a small estate, where the mansion was surrounded by horse-chestnuts, Scotch pines and poplars, it was arranged that no entry of these should be made in a field valuation of the timber.

(2) In my remarks upon the method of measurement for sale I should have omitted the word "*cube*" and have said "*per foot*" only, the custom being—as Mr. Watney states—to sell all timber off an estate by quarter-girth measurement.

(3) Tellars are variously estimated, and in all cases much must be left to the judgment of the valuer. But, as a general rule, the size of a sapling—when considered in relation to its species and growth—determines its value.

(4) In this part of Kent it is customary to measure fallen timber according to the contents of the spire and one branch, where more than one is left upon the trunk, the vendor choosing the one for measurement.

(5) Allowance for bark is not unfrequently a cause of contention between valuers, and it is to avoid this that an allowance of one inch per foot throughout is commonly agreed upon. But practice shows that though this may be a very convenient method it is often a very unfair one.

(6) I fully endorse Mr. Watney's remarks upon the proper method of estimating the bark, viz. that it must be taken "upon the average of the whole fall during the season." And the figures I give are obtained from data founded on the observations of many years and in various localities.

Pluckley, Kent. A. J. BURROWS.

DOGWOOD.

SIR,—In the May number of the *Journal* there is an interesting and instructive article on the "Prices of Forest Produce and Cost of Work." The writer, however, is in error in describing the *Cornus florida*, or common dogwood, as being "the most valuable wood for the manufacture of gunpowder, and makes the finest description of it." He further states: "It is sold by the bundle, which girths 3 ft. round and 5 ft. long, at 2s. 4d., or about 80s. per ton in the green state, in the south of England." Now this shrub is not used at all in the manufacture of gunpowder. What is known among gunpowder manufacturers as "Dogwood" is not the *Cornus*

florida, but the *Rhamnus frangula*, and is grown extensively in Sussex for this purpose. It is peeled and put up in bundles, as described by the writer of the article, and sold at about £14 per ton delivered at the powder works. It is also imported largely from Holland, but the foreign article is not equal to that grown in the south of England, and is sold at about £8 10s. per ton. Loudon, in his description of the *Rhamnus frangula*, says, "The charcoal prepared from the wood is preferred by the makers of gunpowder to any other" As an instance of how even gunpowder makers are misled by the confusing of this plant with the true dogwood, I may state that on a visit to a powder works not far from Edinburgh, during last summer, I observed a portion of ground planted with the common dogwood (*Cornus florida*), which had been procured from an Edinburgh nurseryman, instead of the *Rhamnus frangula*. I think they had been growing two years before the mistake was discovered. The *Rhamnus frangula* is perfectly hardy, growing freely in the north of Scotland, where it ripens its seeds; can be easily raised from seeds or layers, and, considering its commercial value, it is surprising that it has not hitherto attracted the attention of Scotch landed proprietors, or their foresters, as an article of forest produce. D. D.

[The "common dogwood" is *Cornus sanguinea*, which grows wild in England. *C. florida* is a native of North America, and by no means common in this country.—ED.]

CONTINENTAL TRAINING FOR INDIAN FORESTERS.

SIR,—I sympathize most fully with your desire to see a School of Forestry established at home, although I have never been able to agree with your views on the training of our Indian foresters on the Continent. Unless we had looked

outside Great Britain for assistance, we should not now have possessed in India a body of forest officers who have a sound idea of the general principles on which forests are produced by the agency of nature as distinguished from plantations, which however extended, cannot be termed forests in the proper sense. It seems to me, however, that we cannot go on indefinitely trusting to other countries for what there can be no earthly reason should not be carried out at home, if only some beginning were made, and in this object (while I fear we must for some time trust, in part, to our neighbours), if you can effect anything, you will have my hearty sympathy.

Yours faithfully,

GEO. F. PEARSON,
Colonel Retired List, attached by the
India Office to the Nancy Forest
School.
Nancy, France.

BLISTER ON LARCH.

SIR.—When I perused the letter by Mr. Scott on this subject, at page 50 of your last issue, I felt grateful to him for, as it were, keeping the matter alive, though I cannot understand his motive for keeping it alive only to torture it. Passing over the first and longest paragraph of his letter, permit me to say a few words on what follows.

The writer says: "Those in the habit of peeling larch have found blister in all its stages. It is covered, *i.e.* (*sic*), immediately under the outer layer of wood; this usually bursts on a succeeding growth, contracts round it, and the syrupy matter it contains mixes with and neutralizes the proper sap, rendering the surface covered with the matter exuded inert."

Now, sir, it is not a fact that "blister" so-called originates "under the outer layer of wood," although its effects are often located there. Neither is it a fact that the outer

layer "usually bursts on a succeeding growth" being superimposed. The site of the "burst" or rupture is not only "usually" but invariably the resin canals of the bark. Bursting inward, the precipitated resin neutralizes the formative or cambium layer. Bursting outwards, the resin exudes unto sun-heat. "I have yet to learn," continues Mr. Scott, "that any one ever saw the blister enlarge itself upwards." In like manner I have yet to learn what, in Mr. Scott's view, is blister. He has told us what is the "cause of blister," and he has told us that blister is "the cause of these external disfigurements," &c., but along this catena of causes we find scarcely a hint as to what blister is. The nearest approach he makes to something of this kind may be learned from these words: "My own observations have always found the extension of the *wound* downwards;" and again, "Larch, when planted on such soil, usually gets covered with blister." From these words we seem to gather that Mr. Scott regards the *wounds* as blisters; and that, after stating that blister was "covered immediately under the outer layer of wood," he now contrives to "cover" the tree with blisters! If the wound be the blister, of which resin is the contents, then it is evident that, as wounds result from "bursts" or rupture, there can be no blister till rupture takes place; hence blisters that "do not burst" are not blisters at all, according to Mr. Scott's own showing.

But, however much it may astonish Mr. Scott, it is a fact that the resin precipitated from these ruptures *does often extend upwards* between the wood and bark, and produces death in the formative cells of the cambium layer. This statement can easily be verified by making a careful longitudinal section of an affected part of a larch stem. Whether this upward progress of the resin is the result of physical or

physiological forces is a question which does not at present require discussion. The fact is so.

With persons who, like myself, consider that unseasonable frosts act a part in producing blister, Mr. Scott has a short and easy way of dealing. He argues in effect, that, because a certain amount of frost does not always produce a corresponding amount of injury to vegetation, the theory that takes cognizance of frost is, therefore, "untenable." To clench this argument he goes on to allege that the aggregate of forest experience "proves a certain amount of elasticity by which vegetation restores itself." Would Mr. Scott tell us, if the above be true, why it is that that principle of elasticity becomes inoperative or ineffective when larch is planted on certain soils which he describes?

Sir, the legs of the lame are unequal, but our author not only limps, he flounders. It is, perhaps, saddest of all to think that our friend should so much identify himself with these incoherent views, and virtually say: "Come one, come all, this rock shall fly from its firm base as soon as I."

Like many a forester, I am guilty of being the author of a theory about this peculiar disease of the larch. Readers will find that theory stated at page 585 of your last volume. I believe that blister so called "results from premature metastasis excited by unseasonable cooling of the tree." Metastasis, or the production of excrementitious matters, I consider to be the immediate cause; while I consider unseasonable frosts, particularly early summer frosts, to be the exciting cause of blister. This theory seems, in my way of thinking, to gather around it all the reliable facts of the case: and while it gathers, it seems to explain them. It seems also fitted to answer some powerful objections to theories founded, like Mr. Scott's, on the nature of the soil irrespective of climate. For example, were it asked why larch suc-

ceeded well for many years after its introduction to the country, and that, too, on soils now pronounced "unsuitable," the theory of bad soil, irrespective of climate, is at once put to bay. The fact that larch did so succeed after its introduction seems, in view of my own theory, to indicate a certain alteration or change of climate, or a certain alteration or change in the constitution of the species. The latter having little to support it, I naturally incline to believe—not without evidence—that there are reasons for suspecting the former. The annual aggregate of frost may or may not have increased, but that its distribution has varied during the last half or three-quarters of a century seems capable of proof, and has already been openly propounded and defended by persons capable of judging. The distribution of frosts, like that of rains, is determined largely by local causes; so that we are not required to swallow the absurdity of the earth having revolted from the sun, or the sun having suffered partial extinction, in order to entertain an intelligent opinion regarding the somewhat capricious times at which frosts now visit us. But, apart altogether from any claims of my theory, I submit that larch is just such a tree as may be expected to suffer from such unseasonable frosts. Its buds are very pronounced on the branches—they are very short, and contain a dense fascicle of leaves—they are very imperfectly, or at least very slenderly, sealed at the apex, compared with the buds of other trees. They are, therefore, easily excited into growth; two sunny days in spring beguile their hardy grey into the most tender and vulnerable green, rendering the tree sensitively liable to damage from frost, at a season when frosts are prevalent. At the time of which we speak the tree is charged with water, "carrying constructive matter in solution." And from this fact it seems possible to

argue that *the sap of the tree getting checked causes rupture* to take place. On examining, however, the matter exuded, we find it to be not watery juice, but resin chiefly, which indicates that the sap with which the resin canals, as well as the tree generally, is charged, is converted into resin before its expulsion from these canals takes place. Again, I am aware that some writers have not been careful to distinguish between and resin the proper nutrient juice of trees, so that resin has too frequently been described as the "vital sap." If this were so, it would follow that some of these badly affected trees must possess an enormous amount of "vitality:" and I believe my friend Mr. Scott would, in that case, be prepared to show us whole plantations of larch "covered" with vitality!

I trust these remarks will elicit further discussion of this interesting and important subject. Kindly pardon the length of this letter, and accept my best wishes for the prosperity of your *Journal*.

JAMES GORDON.

Luss, N.B. May 18, 1881.

PRUNING.

SIR,—I read with pleasure the instructive paper on Pruning, by Mr. Michie (page 702, vol. 4 of the *Journal*), and while agreeing with much that is therein written, there is one small point on which our ideas somewhat differ. Near the top of page 709, he says that the clearing of the bole is performed upon young trees with the pruning-knife, but in the case of tall trees and those further advanced the pruning chisel is employed. I at once admit that, in the hands of a skilful operator, the pruning chisel may be an effective and speedy implement for removing small branches, whose bases open at an acute angle with the stem of the tree, and where there is no ring-swell upon their base. It not unfrequently occurs that as trees

advance in size, many of their lower branches become almost square with the stem of the tree at their base. If the situation be somewhat high-lying or exposed, there will also certainly be a portion of ring-swell on the base of many of the branches. However skilful a workman may be or however good his tools, I have frequently found that a branch of any size, if springing from the stem near to the square, or having much ring-swell upon its base, cannot be cut with the chisel without so far shattering the wound on its upper margin. This may not be apparent at once, but it shows after the wound has been some time exposed to the weather. First cutting off the branch at a short distance from the stem, and then removing the stump lessens the evil; but in my experience I have always considered that all branches much over one inch in diameter, and especially those more particularly referred to, can be best removed by means of the pruning-saw and afterwards dressing the wounds. Whenever the branch is so large that the operator is unable to properly balance it with his left hand, it should first be sawn through at say about 12 or 15 inches from the stem, and then what remains sawn off afterwards. At first sight it may appear as if it would take much more time to saw it twice than once only, but the difference is not great, as the operator can work with more freedom and can also make a much better job. J. W.

SLIDE RULES.

SIR,—In answer to "Sylvio" (page 53 of *Journal*, May, 1881), I would recommend him to write to Mr. Stanley, Great Turnstile, Holborn, E.C., for a slide rule. I had a special one made there some time ago, 10 inches long when shut, and 24 inches when open. The rule is divided to $\frac{1}{4}$ inches only, and the slide is simplified by omitting lines A and B, as C and D are all that are required for timber computations.

I have Charles Hoare's slide rule, and also his book "The Slide Rule, and How to Use It," both of which I shall be pleased to lend "Sylvio." But for timber purposes I do not recommend Hoare's rule: it is cut differently to the ordinary "Cogeshall's" rule, is more difficult to use, and I regard it as a scientific toy.

Nesbit's "Mensuration" is a very good work, and contains a chapter treating on the slide rule.

ALF. W. STEVENS.

Englefield, Reading.

SIR,—"Sylvio" (page 53) will find ample instructions, in regard to the Slide Rule, in one of Weall's Rudimentary Series: "The Slide Rule, and How to Use It." By Charles Hoare, C.E., in tuck of cover, with a Slide Rule, price 3s. It contains full, easy, and simple instructions, to perform all business calculations with unexampled rapidity and accuracy. J. KAY

DEAR SIR,—Your correspondent "Sylvio" will find all the information he asks for in a small pamphlet entitled, "The Carpenter's Slide Rule, its History and Use," issued by Messrs. John Rabone & Sons, Hockley Abbey Works, Birmingham, who are also manufacturers of slide rules. The price of the pamphlet is only 3d. A. J. B.

SIR,—In answer to "Sylvio," may say there is a very useful little work extant, which, amongst other valuable timber tables, contains a treatise on the Sliding Rule, and its especial uses for measuring timber, &c., together with several examples and rules for its working: it is termed the "Timber Merchant and Builder's Vade Mecum," and the price is 2s., to be had of any bookseller, or of the publishers of the *Journal*.

"QUARTER GIETH."

LIMESTONE FOSSIL.

SIR,—I herewith enclose a small polished bit of stone, showing some curious fossils embedded in it. The piece sent was broken off a specimen about 4 inches across and an inch thick, which was found in the home nursery at Craighall, Forfarshire, at an elevation of about 450 feet above the sea. The soil is a light alluvial loam, resting on rotten rock subsoil. I will feel obliged by being told the name of the fossil.

QUERCUS.

[Your specimen is mountain limestone, with a good example of fossil coral, *Lithostrotion irregulare*, embedded in it. These "Madrepores," or lamelliferous corals, are common in the older limestone strata, and are found in nearly all the lower limestones of central Scotland.—Ed.]

TO PROTECT TREES FROM RABBITS.

SIR,—In your *Journal* of last month, at page 65, the method adopted by Mr. Roberts, of tying the prunings of *Rhododendron ponticum* round the stems of ornamental trees planted in woodlands to protect them against the ravages of rabbits, cannot fail to be taken advantage of by many readers. As many foresters and others, however, may not have such prunings at their command, it may benefit them to know that I have had the stems of numerous ornamental trees under my charge covered round and effectively protected against rabbits on a system successfully practised by me over a series of years, and one which I have found infinitely superior to any other brought under my notice.

Heather is the substance used by me, either short or long, but the latter is preferable, as with it the operation can be accomplished more expeditiously. The *modus operandi* is briefly thus:—Two expert men, the one laying on the heather (beginning at the root), the other at the same time tying with lacing

wire or tarred twine, could cover to a height above the reach of rabbits at least one hundred and fifty newly-planted trees in a day. Care must be taken, however, in slackening and lengthening the tying material as the increased circumference of the young trees requires.

One cart of heather would in most cases be sufficient for several thousand trees (but that must of course depend on their size), lasting for several years, and might, if desired, be taken off in summer and replaced in winter.

A most commendable feature in favour of heather is that its colour bears such close resemblance to the bark of most trees, especially fruit trees, which may be covered with it and yet almost undiscernible in the absence of close inspection.

In lawns, gardens, or sides of approaches, the heather, if neatly tied on with twine or lacing wire, cannot fail to be held in favour, as against the brown withered leaves of spruce twigs and *Rhododendron ponticum*, for in such exposed situations they must necessarily present a very unpleasant appearance.

The heather supply throughout Scotland is inexhaustible, and could be procured for the purpose, in bales like hay, on very reasonable terms.

D. STALKER, Forester.

Benmore Estates, Argyleshire.

BIRD CHERRY.

SIR,—Would you please to let me know the name of the enclosed plant through the medium of your *Journal* and greatly oblige. J. S.

[The Bird Cherry, *Cerasus Padus*, is known also as the "Fowl Cherry," and in Scotland "Hag-berry." It grows wild throughout most parts of the country, and forms a beautiful object when covered with abundance of its pure white flowers. Its small black fruit are unpalatable to man, but are much relished by several kinds of birds.—Ed.]

THE EFFECTS OF THE SEVERE WINTER.

SIR,—At this place, which stands 300 feet above the sea, *Pittosporum Moyii* and *Eleagnus Japonica*, were killed during past winter. Many large Bays and *Thujas* are killed in gardens near Plymouth. At Tregonnett, near Callington, Cornwall, all the *Pinus insignis* are killed, one being more than 30 feet high and standing on a hill.

I planted four young tree sets of this beautiful pine and did not succeed in getting one 10 feet high until I raised some from seed in the wood—33 in number—of these 7 were alive in May, 1880.

H. ROGERS.

Hartley, near Plymouth.

INJURY TO LARCH TREES.

SIR,—May I ask you kindly to give me your advice as to the following:—

About 13 years ago, I bought a small property on the borders of Dartmoor, about 1,000 feet above the sea. On it was a plantation of Larch, then about 7 years old. Since the purchase I have yearly planted more, and there are now many acres altogether, some in sheltered, others in more exposed situations. The old plantation has been thinned from time to time, and the earliest of those planted by myself have been thinned once—partly two years ago—the remainder at intervals since that time. Besides being thinned, the trees have been trimmed up about 4 or 5 feet—which seemed to do them good. Until last year nothing could have been doing better than the trees. Then, in some instances, the leaders showed a want of life, though the rest of the trees seemed healthy enough. This was supposed to be the result of the previous very wet season. In the spring of this year the trees budded as usual, and about a fortnight ago were looking as green and healthy as possible.

Since then, however, they have been gradually dying back, both in the leaders and side branches, and in many places there is not a sound tree to be seen. I forward one or two pieces of the branches that you may see their state, and shall be much obliged to you if you can in any way explain the cause of it.

Beyond the unusually cold winter, and the severe east wind in April, there has been no atmospheric cause that I am aware of to affect them, and in previous seasons they have stood both cold and wind perfectly well.

The injured trees are not confined to one spot, nor to any particular size, these in the old plantations, as well as many that have very recently been planted, suffering alike, except that those in the *oldest* and *youngest* of the plantations are attacked more in the leaders than the side branches. I shall be much obliged to you if you can help to explain the cause of the misfortune, though I am afraid there may be no remedy for it, and that the time and money expended may be all in vain. I may add that I have had the branches microscopically examined, and no blight can be detected.

J.

[The larch twigs sent us appear to be frost-bitten, and also show a few spots of incipient blister. Their condition is clearly due to the effect of the past severe seasons. The twigs indicate that the trees have grown with considerable vigour, but in the past excessively wet and cold seasons they have been unable to thoroughly ripen their annual growth. This renders them more susceptible to injury from the severity of the weather, and the unusually severe frost of the past winter, accompanied in many instances by bitter storms of wind, has done a vast amount of injury to trees and shrubs, especially in parts of the country where the growth of last year was not well ripened. Wet or undrained land,

and a cold, ungenial soil, would aggravate the tendency to injury from frost. The trees seem to be properly managed, and with a return of genial seasons, those that are not seriously injured will quickly recover. A case of this kind should not deter anyone from planting larch, because of late the seasons have been so exceptionally severe that there is a great probability the same amount of injury to trees by severe frost will not be seen again for many years. There is no blight or aphid on the specimens sent us, but we should be glad to hear that the trees escape an attack of it during the summer in their weak and sickly condition.—Ed.]

THE PLANE AND SYCAMORE.

SIR,—Can any of your readers tell me the difference between Planes and Sycamores? Is it in the bark, stem, habit, or foliage? and, How can I distinguish the one from the other?
Forfarshire. RANKIN.

[Our correspondent will find no difficulty in distinguishing the Sycamore (*Acer pseudo-platanus*) from the Plane (*Platanus orientalis*), when he meets with the two trees. In Scotland, however, the Sycamore is popularly known as the "Plane," or "Plane-tree," and much confusion is thus engendered. The *Acer pseudo-platanus*, the "Great Maple," "Mock Plane," "Sycamore," or "Plane-tree" of Scotland, is not the "Sycamore" of Scripture, which is a totally different tree—a species of Fig (*Ficus Sycomorus*)—but the name "Sycamore" has been applied to the Great Maple from very early times; having originated probably from both possessing dense heads of foliage, which at a distance appear to be not unlike each other. The term "Sycamore" is the common name by which the *Acer pseudo-platanus* is best known throughout English speaking countries, and should be adopted in Scotland, to prevent confusion with the true

Plane. Many fine specimens of the Plane exist in this country, chiefly in the grounds attached to old family mansions, but it is by no means a common forest tree like the Sycamore. It is a favourite ornamental tree, a quick grower, and the wood is esteemed by the cabinet-maker, owing to its smoothness of grain, and the ease with which it takes on a high polish.—Ed.]

ENGLISH AND AMERICAN FARMERS.

FROM the report of Messrs. READ and PEARL on American agriculture, we make the following extract:—"Few English farmers have any idea of the hard and constant work which falls to the lot of even well-to-do farmers in America. Save in the harvest, certainly no agricultural labourer in England expends anything like the same time and strength in his day's work; therefore, it is essential to guard against putting the value of the farmer's own labour at too low a figure, and to make due allowance for the drawback which must occur upon the most skilfully managed and best arranged big farms. The readiness with which the tillers of the soil take to machinery in America would surprise some of the farmers in the old country. The skill and ease with which they are worked say something for the manufacturer, but still more for the intelligence of the farmer. In America the presence of labour-saving machinery upon even a small farm is an absolute necessity. The land is level, the soil light, the climate dry, and the crops by no means bulky. Under these favourable circumstances, machines that would soon come to grief in England, work well for many seasons in America. The tools are certainly lighter, better shaped, and better made. It may be true that 'a good workman never finds fault with his tools'; but it is truer still that a Yankee labourer is too sensible ever to work with a bad one."



Arboriculture. By John Grigor. Second Edition. Edinburgh: Oliphant, Anderson, and Ferrier.

Almost simultaneously with the appearance of the second edition of this valuable work comes the intelligence that its author died at Forres on the 14th ult., at an advanced age. The preface to this edition foreshadows the event, the news of which will be received with regret by all foresters and lovers of the science of arboriculture, in which field Mr. Grigor was for more than half a century an earnest and an able worker. Of him it may well be said that he died in harness, and he has perpetuated his good work by the re-issue of a volume which has formed a valuable text-book for many among the present generation of foresters. His writings and the results of his labours are abundantly reflected in not a few of the publications of the last thirty years.

From the time of his establishment of the Forres Nurseries, down to the present time, Mr. Grigor's name has been prominently before the public. His contributions to the "Journal of the Highland and Agricultural Society of Scotland," many of which obtained the society's prizes, and his articles in Morton's "Cyclopædia of Agriculture," published in 1855, gave proof of his abilities as a writer; and as long ago as 1848 London, in his great work "*Aboretum et Fruticetum Britannicum*," acknowledged his indebtedness to our author.

A remark in the preface to the present volume, though less applicable to the practices of the present day than to those of the period at which it was written, is deserving

of notice:—"It is a remarkable fact that the same care is not manifested in the formation of timber plantations in general, which may last for a century, that is usually shown in the laying down of any of the common crops in agriculture."

Besides containing a succinct account of all the more useful and ornamental British forest trees, the volume has a valuable calendar of operations, and excellent chapters on acclimatization, nursery grounds, preparations for tree-planting, including drainage, planting and thinning, pruning, sea-side planting, the treatment of coppice and hedgerow timber, harvesting bark, rearing and keeping up hedges, &c.

Siberia in Europe. BY HENRY SEEBOHM. London: John Murray, Albermarle Street.

Mr. Seebohm was accompanied by his friend, J. A. Harvie-Brown, Esq., of Dunipace, a name well known to readers of the *Journal of Forestry* and to ornithologists. The trip occupied little more than six months; but as nearly eighteen weeks were taken up in the outward and homeward journeys and in awaiting the arrival of spring, only nine weeks were left for the bulk of the ornithological work in the Petchora valley. Some of the difficulties of the journey are depicted in the admirable illustrations of sledging adventures. Nearly fifty plates adorn the pages, and add greatly to the value of the work.

The main object of the journey was the solution of six problems,—viz., the ascertaining of the exact breeding grounds of the Grey Plover, the Knot, the Curlew Sandpiper, the Sanderling, the Little Stint, and

Bewick's Swan. Their route lay by way of St. Petersburg, Moscow, Vologda, Archangel, Mezen, and Ust Zylma. A useful map is given at the end of the volume, upon which is marked the entire route and the position of the Petchora river and valley.

Arrived at St. Petersburg, our travellers paid a visit to the frozen market, where "one stall was full of frozen pigs, another laden almost mountain high with frozen sides of oxen and deer. Part of the market was occupied by rows of stalls, on which the frozen fish lay piled up in sacks. Another portion devoted to birds and game, heaps of capercailzie, black grouse, hazel grouse, willow grouse, stacks of white hares, and baskets full of small birds." The sensation produced in sledging over the roads towards Archangel is described as being somewhat similar to that which Sancho Panza must have felt when he was tossed in the blanket. And later on in the volume we have a description of a ride upon a "rosposki," which must be one of the most Spartan of vehicles—"a machine composed of four wheels, about two feet in diameter, the axle-trees of which are connected by three parallel poles, upon which we sat. This vehicle is, without exception, the most uncomfortable carriage it has ever been my ill luck to travel in. There is no support for the back, nothing to hold on by the sides; only three bare poles to sit on, and not height enough from the ground to swing one's legs about in peace."

A Russian forest road is described as a *via diabolica*, upon which the sledge banged about from pillar to post to such an extent that the want of other exercise was not felt. Sometimes the sledge was on the top of a steep hill, the first horse in the valley, and the third horse on the top of the next hill, so that the motion was like that of a boat in a chopping sea. "On one occasion

the crust of snow not being firm enough to support the horses, they all three suddenly sank up to their bellies. Of course they were utterly helpless. We feared for a moment that our journey had suddenly come to an end, and that we had hopelessly stuck fast. We alighted from the sledges, which had not stuck in the snow. The two yemschicks set to work in good earnest, and we doffed our malitzas and followed suit. The horses were unharnessed, and we soon succeeded in making them struggle out on to firm ground. We had no difficulty in pushing the sledge after them, and were soon ready to start again."

At Ust Zylma, a straggling village on the banks of the Petchora river, where beef was retailed at 1½d. per lb., we are introduced to the "Old Believers," of whom it is stated—"they have a curious prejudice against tobacco, and will not smoke it themselves, nor, if they can help it, allow other persons to smoke in their houses. They seem to have Jewish superstitions against pork and hare, neither will they use any plate, glass, or other article from which persons not of their religion have eaten or drunk. If you offer them vodka in your own glass, they will refuse it if they be strict Old Believers; but we must do them the justice to say that under circumstances of this kind many we met were superior to their superstitions. But the most extraordinary feature of their religion is that it forbids the use of potatoes as food."

The book contains a vivid picture of the Samoyedes, whose wealth consists in their reindeer, some of them possessing as many as 10,000 of these animals, worth about seven or eight roubles or a sovereign each. These people are very expert in throwing the lasso. They are a nomadic race, and the following description of Samoyede courtship is given:—"When a young Samoyede desires to marry, and has come to

some understanding with the damsel of his choice, he visits her father's choom, and with a short stick taps him and then the mother of the maiden, on the shoulder. He then demands the girl in marriage, and offers the father and mother a glass of vodka, which he has brought with him. As a token of his goodwill the father drinks the vodka; he tells the young man he has no objection, but that he must ask the girl's consent. The preliminary ceremony of asking papa having been gone through the young man retires. A few days later he comes again to the choom; this time accompanied by what servants he has, and provided with plenty of vodka. His retinue remain outside, while he enters the choom and seats himself by the side of his lady-love. The father hands the young man a glass of vodka; he drinks half and hands the half-full glass under his left arm to the girl, who finishes it. The father then give his daughter a glass of vodka, who in like manner drinks half of it and presents the remainder with her left hand under her right arm to her lover, who drains the glass. After this the father hands a piece of raw flesh to the young man, who eats it, and then takes a piece from the floor, eats half, and presents the other half under his left arm to the girl to finish. She, in her turn, takes a piece of raw flesh from the floor, eats half, and likewise hands the other half under her right arm to the young man to finish. Then follow the eating and drinking that in barbarous, as in civilized nations, is considered necessary to ratify the ceremony.

On another occasion our author assisted at a wedding in the orthodox Greek Church, where the ceremony was very imposing. "The priest met the couple at the vestibule of the church. After going through a form of prayer, he presented the bride and bridegroom with a lighted

taper, which he had first crossed over their bowed heads; the rings likewise were crossed over their heads, as were also a pair of gold crowns before being placed upon them. The Bible and the crucifix were kissed. A silver cup of wine was quaffed by the plighted pair, each drinking from it alternately. Censers of incense were swung. The priest, the happy couple, and the assistants bowed and crossed themselves continually, and between each part of the ceremony prayers were offered."

Rare birds abounded everywhere, and the volume teems with narrative of successful shooting expeditions. One of the most interesting chapters is that on the migration of birds which was written in Heligoland, the little island being graphically depicted both by pen and pencil.

The rafting of timber upon the Petchora river is thus described:—"The larch is felled in the forests five or six hundred miles up the river, and roughly squared into logs varying from two to three feet in diameter. It is floated down in enormous rafts, the logs being bound together with willows and hazel boughs. These rafts are manned by a large crew, some of whom help to steer it down the current with oars and poles, and others are hired for the season to assist in loading the ships at Alexievka. Many of the men bring their wives with them to cook for the party: sleeping huts are erected on the raft, and it becomes to all intents and purposes a little floating village, which is frequently three months in making the voyage down the river. Marriages have been known to take place on these rafts; occasionally a funeral has to be performed; and sometimes all hands are engaged in helping to keep the raft from running ashore or grounding on a sandbank. Sometimes in stormy weather it is necessary to moor the raft under

the lee of an island or a promontory, to avoid the danger of having it broken up by the violence of the waves."

One more extract and we take leave of this most interesting volume. The woods at Habaraki on the banks of the Petchora river are thus described:—"These proved an inexhaustible source of interest to us and one in no wise lacking in variety. There was much beauty in these woods. Under foot spread a carpet of soft green moss and lichens, the thick moss predominating in the older and thicker parts of the forest, while the reindeer moss and the many coloured lichens abounded in the younger and more open woods. Stray bushes of arbutus and rhododendrons, bushes of bilberry, crowberry, cranberry, the fruit of which was preserved by seven month's frost, clumps of carices and other vegetation decked the shady aisles. The monotony of the great pine forest was varied by the delicate lines of willow and alder thickets, by plantations of young pines and fir, by clumps of tall spruce and haggard old larches, while here and there a fine birch spread abroad its glossy foliage, or a gaunt Scotch fir extended wide its copper-coloured arms. All around lay strewn trunks and branches of timber, fallen or felled, in every stage of decomposition, from the hoary log, moss-covered and turned to tinder, to the newly-lopped branches of some lofty forest patriarch, whose magnificent boughs had been wantonly cut up to furnish firewood for Sideroff's steamer.

Foregone Conclusions: The Bessborough Commission.—This is another of the series of instructive pamphlets issued by the Irish Land Committee. Apart from any party or political signification, in these few pages the whole question of the value to be attached to the proposals of this Commission is put plainly

before the reader. Home-thrusts are seldom acceptable, and wholesome advice to the teeming and unsettled population of the Green Isle proves equally unpalatable whether it comes from one who has long laboured for the interests of the people, like the Chancellor of the Duchy of Lancaster, who has lately spoken plainly, or from those whom the Irish have learnt to look upon as hereditary enemies.

The difficulties which surround the Irish Land Question are shown by the divergence of opinion which is the outcome of the Bessborough Commission, appointed in July, 1880. The Blue Book, recently issued, contains no less than four separate reports, one being signed by the chairman and three other members, two of whom publish supplementary reports, while a separate report emanates from Mr. Kavanagh. These reports embody the greatest diversities of opinion, and it is a significant fact that among the members of Lord Bessborough's Commission only two are entirely in accord. It should also be remembered that since the report was drawn up a large mass of rebutting evidence has been received.

The report deals at length with the Ulster Tenant Right and the customs of other parts of Ireland, all of which it construes so as to favour the adoption of a statutory tenure which legislation is to bestow. Long leases find little favour, because "rents are found almost invariably to be raised on their termination." Consequently "it has seemed better to abide by the tradition, and trust to the easiness of the landlord and the chapter of accidents."

As an answer to calumnies which have been profusely heaped upon the heads of Irish landlords, we may take the following:—"A tenant who pays his rent is very seldom evicted. Farms have remained in the same families, have descended from father to son, and are considered

planting any but the hardiest varieties, especially in low situations, with the prospect of other Arctic winters.

*THE LONDON SPARROW,
FROM A TRANSATLANTIC
POINT OF VIEW.*

WE learn from a recent report of the Montreal Horticultural Society that the English sparrow (*Passer domesticus*), which has been designedly rather than accidentally introduced in America, owes his presence to his well-known insectivorous habits. Buffon estimated that a pair of sparrows during the breeding season destroy 4,000 caterpillars weekly. In this way they greatly assist in keeping down the insect pests in Europe, and have conferred similar advantages on many parts of America, where it has been introduced. It supports equally well severe cold and extreme heat. Not being migratory, its insect-hunting practices continue all the year round, and the full benefit therefore is secured. The sparrow is a bold and somewhat intrusive bird, used to city life, city manners, and city smoke, and quite capable of holding his own against most birds of his own size. But in some places where it has been introduced, and has done immense good in keeping down and extirpating some of our most destructive insect foes, such, for instance, as the canker-worm, these benefits have been forgotten, and the benefactor denounced as a nuisance—not, by the way, an uncommon occurrence among men. He is charged with driving away other birds, with making a constant noise, which cannot be termed musical, and with other heinous crimes deserving capital punishment. Many of these charges are unjust, and, could his accusers have their way, the sparrow would soon be avenged by the mischief which his insect-food, if uneaten, would do. Says

Mr. Galvin, forester to the city of Boston:—

“The introduction of the English sparrow was immediately attended with benefit almost beyond calculation. The trees on the common were infested with a nasty yellow caterpillar, which destroyed the leaves and buds of the elms and other trees. These insects increased very rapidly, in spite of all that my men could do to destroy them; and at the south end the elm trees were eaten every June by swarms of canker-worms. Both these pests have been pretty nearly exterminated. But for the sparrow, however, they would return. I believe that the wages of all my men could not compensate Boston for the loss of the sparrow. I say, without hesitation, that the sparrow does *not* molest or interfere with any other bird. All the summer he is with the (American) robin and the bluebird, and I have never witnessed animosity myself nor have any of my men. The robins were more numerous on the common last year than ever before. The chip sparrows have also become very numerous, and may be seen feeding with the English sparrows on the same bits of bread. Before the sparrows came there were no bluebirds; now they are quite common, and often treat the sparrows very badly and break up their nests. The sparrows of course show fight, but the bluebirds are always too strong for them.”

This long extract is given, somewhat condensed, in the hope that it may lead some to remember that the destruction of a benefactor, when a part of his benefit has been enjoyed, is the sure way to bring back the evil he has in part removed. It is killing the goose that has laid the golden eggs. At the same time, it is quite possible and would accord with the analogy pointed out in this paper, that the bird may sometimes so increase as to become mischievous. Many of the complaints concerning it must, however, be received with

great caution, for even when they are charged with destroying buds, these buds may contain insects, and the little fruit they take is only a tithe of what they save. Other devices than their destruction may be resorted to to save fruit from their attacks. The English naturalist, the Rev. J. G. Wood, says in his *Natural History*: "In every case where the sparrow has been extirpated, there has been a proportionate decrease of the crops from the ravages of insects, as in Maine and Auxerre (France)." Let us pause before yielding to the hue-and-cry now raised in some quarters against the English sparrow. Though at rather undue length on this point, I may add the following:—A friend of mine, in this neighbourhood (Antioch, Ohio), desirous of seeing more birds about his farm, and finding that the canker-worm was attacking his white elms and apple-trees, bought a dozen young English sparrows, at Cleveland, about the year 1872, for 18 dollars, a price which would create some stir among English boys. Nine of them died, leaving a cock and two hens. Next year these Mormons built two nests and reared the young. By the end of the following season the family numbered thirty. Not a canker-worm has since been seen on the premises. The sparrows were seen devouring them wholesale. They live with the other birds, building in the same cut with the martins, who will sometimes drive them off and break up their nests. The bluebird and chip-sparrow are very friendly with them. One American robin, or blue jay, will do as much mischief among the fruit as fifty English sparrows.

THE CUTTING AND SEASONING OF TIMBER.

PROFESSOR ANDERSON, in his work on the strength of materials, says, that "the properties of

timber are worthy of careful attention, and the student should be familiar not only with the external appearance of the principal kinds of wood, but also with their relative strength, stiffness, toughness, and durability." If we could investigate the properties of timber with the same care which has been bestowed on the metals, we should find that there is an even greater variation in the properties of different kinds of wood. The greater number of the varieties of wood owe their commercial value to special characteristics, such as their beauty of grain and capability of being polished.

The strength of a piece of timber depends upon the part of the tree from which it is taken. Up to a certain age, the heart of the tree is the best; after that period it begins to fail gradually. The worst part of the tree is the sap-wood, which is next the bark. It is softer than the other parts of the wood, and is liable to premature decay. The deleterious component of the sap-wood is absorbed if the tree is allowed to grow for a longer period, and in time the old sap-wood becomes proper fibre timber similar to heart-wood. Hence the goodness of a tree for timber purposes depends on the age at which the tree is cut. When young, the heart-wood is the best; at maturity, with the exception of the sap-wood, the trunk is equally good throughout, and when the tree is allowed to grow too long, the heart-wood is the first to show symptoms of weakness and deteriorates gradually. The ash, beech, elm, and fir are generally considered at their best when of from 70 to 80 years' growth, and the oak is seldom at its best in less than 100 years; much, however, depending on surrounding circumstances. As a rule, trees should not be cut before arriving at maturity, because there is then too much sap-wood, and the durability is much inferior to that of trees at their full development.

The strength of many woods is

nearly doubled by the process of seasoning; hence timber used in its green state is not only weak, but is exposed to continual change of bulk, form, and stability. Wood will always warp after a fresh surface has been exposed, and will change its form by the presence of moisture. The effect of moisture on dry wood is to cause the tubular fibres to swell; hence, if a board be wet upon one side the fibres there will be distended and the board will bend. The natural law that governs the shrinking or contraction of timber is most important to practical men, but it is too often overlooked. The amount of the shrinkage of timber in length when seasoning is so inconsiderable that it may in practice be disregarded; but the shrinkage in transverse directions is much greater, and presents some peculiarities which can only be explained by examining the structure of the wood as resulting from its mode of growth.

An examination of the end section of any exogenous tree, such as beech or oak, will show the general arrangement of its structure. It consists of a mass of longitudinal fibrous tubes, arranged in irregular circles, which are bound together by means of radial plates or rays, which have been variously named; they are the "silver grain" of the carpenter, or the "medullary rays" of the botanist, and are in reality the same as the pith. The radial direction of these plates or rays and the longitudinal disposition of the woody fibre must be considered in order to understand the action of seasoning; for the lateral contraction or collapsing of the longitudinal fibrous or tubular part of the structure cannot take place without first tearing the medullary rays, hence the shrinking of the wooden bundles finds relief by splitting the timber in radial lines from the centre parallel with the medullary rays, thereby enabling the tree to maintain its full diameter. If the entire mass of tubular fibre composing the tree

were to contract bodily, then the medullary rays would, of necessity, have to be crushed in the radial direction to enable it to take place, and the timber would thus be as much injured in proportion as would be the case in crushing the wood in a longitudinal direction.

THE BRITISH TIMBER AND BARK TRADE.

RESULTS OF RECENT SALES.

THE following reports are taken from our contemporary, *The Timber Trades Journal*.

BUCKS.—On the 27th April, Mr. Wm. Ford held a sale at Chesham of 177 butts of beech timber on the Latimer Estate, in accordance with instructions from Lord Chesham. The prices realized ranged from 1s. to 1s. 7d. per cubic ft., average 1s. 4d., the demand being pretty fair. There was a good attendance of local buyers, chief among whom were Messrs. East & Sons, of Berkhamsted, and Messrs. R. Webb & Sons.

DEVON.—On May 5th Mr. J. C. Snell held a sale at Bowerthly Wood, Lapford, of 1,200 larch fir trees, which were all sold in lots of 50 each, and prices ranged from £25 to £51 a lot, or on an average from 8d. to 9d. per foot. Sale resulted in a total of £881 7s. 6d. Amongst the principal buyers were Mr. Symons, Barnstaple, Devon; Messrs. Sully, Bridgwater; Mr. Bowerman, Bridgwater; Mr. Jonathan Cruse, Bruton, Somerset; Messrs. Wiffen & Co., Holworthy, Devon. Attendance of buyers not large.

HEREFORDSHIRE.—The fall of timber this season is rather above the average, and bark is much lower in price than it has been for some years. £3 10s. per ton of 22 cwt. (weighed over the city machine), less 2½ per cent., was the price given last week for best coppice bark.

SCOTLAND.—On the 25th April an extensive sale of wood took place at Ballinloch, Alyth. The sale was largely attended, and the competition active, which resulted in high prices being obtained.

STAFFORD.—On the 28th April Mr. F. H. Walker held a sale near Uttoxeter of 779 ash, elm, spruce, poplar, alder, and other timber trees on the Loxley Park Estate. The prices realized ranged from 8d. to 1s. 3d. per foot. There seemed to be a fair demand, and competition good. The principal buyers were Roe & Son, Derby; R. & J. Church, Dudley; Bagshaw Bros., Marchington; Dawson, Hanley; Turner & Son, Barlaston; Riley, Burton-on-Trent; J. Wake, Uttoxeter.

There were, on the 6th May, sold by private tender 3,000 larch trees uncut, belonging to Mr. John Wallace, of Aucharroch, Alyth, Scotland. The purchaser was Mr. Lewis Miller, Orieff, and the price paid was £683.

On the 12th May a sale of cut wood took place on the Earl of Southesk's Montreatmount plantations, Kinnsaird. Nearly 600 lots, chiefly of larch and Scotch fir, were disposed of. Prices ruled considerably higher than usual. The principal buyers were Messrs. Wm. Black & Son, Brechin; Ogg & Sons, Fricockheim; J. Ewen, Forfar; M'Donald, Arbroath; and John Miller, Blackiefield.

NORTHAMPTONSHIRE.—On the 19th May Messrs. Richardson held their thirty-third annual sale at the George Hotel, Stamford, and disposed of 300 tons at prices ranging from £2 15s. to £3 7s. 6d. delivered on rail. Some further lots, amounting to 60 tons, realized from £3 5s. to £3 10s. per ton.

LINCOLN.—On the 20th of May Messrs. Parish & Son held a sale at the Great Northern Hotel, Lincoln, of about 150 tons, which realized from £3 to £3 15s. per ton, free on rail. The buyers were Messrs. Blades, Epworth; Gelsthorpe, Louth; Johnson, Dewsbury; Shera & Sons, Horncastle; Lee, Retford; and Crook & Sons, Huddersfield.

CHIPS AND SLIPS.

THE LORD WARDENSHIP OF EPPING FOREST.—Sir Arthur Hobhouse, the Epping Forest Arbitrator, has heard the application of the trustees of the late Earl of Mornington, hereditary Lord Warden of Epping Forest, for compensation for the extinguishment of the office by the last Act. In

giving judgment, the Arbitrator said he could not find that there was any basis of emolument on which he could award compensation. All the patronage, as well as the perquisites, had perished in great measure, owing to the acts of the Lord Wardens themselves, and nothing remained but the title. The Conservators held that no compensation should be awarded for the loss of title, because the Lord Wardens had injured the forest by neglect, and, moreover, shielded those who had encroached on it. The language of the Act, however, was conclusive against such an argument, and, whatever might have been the conduct of former Lord Wardens, the present representatives of the lords of the manor had shown a fairness and moderation which inclined him to listen with great respect to their claims. He should disallow all claim for emoluments, but award £300 as the value of title, with the plaintiffs' costs.

YEWS AND CHESTNUTS.—The approach to the Wimborne Minster Cemetery, Dorset, consists of a fine avenue of Horse Chestnuts, planted about fifteen years ago. They were considered wide apart, and about eight years ago between each tree a Yew tree was put in. This seems to have produced most unfortunate results, for the Horse Chestnuts are rapidly dying. The effect, whatever it may be, is at present attributed by the Board to some poisonous property proceeding from the roots of the Yew trees.

A NEW PRODUCT FROM BIRCH BARK.

—A French inventor has recently patented a method of improving india-rubber and gutta-percha by the addition of a distillate of birch bark. By distilling the outer layers of the bark he obtains a dense black gummy matter, which possesses the properties of ordinary gutta-percha with the additional quality of resisting both the action of air and the strongest corrosive acids. He claims also that by adding a small proportion of the birch-bark gum to gutta-percha, or to india rubber (one twentieth part will suffice), the durability of the rubber or the gutta-percha will be greatly increased, the new mixture not being acted upon by the air or by acids.

—*The British Mail.*

FIRE IN WHARNCLIFFE WOOD.—Another fire has occurred in Wharncliffe Wood, caused by the sparks from a passing engine, as on the previous occasion, three weeks ago, when fully fifty acres of ground were almost cleared. On the 9th ult. a fire broke out in two different places, within an hour of each other, and although every effort was made by the woodmen and others to subdue the flames, about an acre and a half in one place and half an acre in the other were completely cleared. Several piles of cordwood, as well as some fine holly trees, were also burnt.

PRIMROSES UNDER FIR TREES.—But few plants will grow, much less flower, satisfactorily under the shade of fir trees; but primroses and polyanthes are an exception, for we have many wide-spreading conifers, the open spaces beneath the lower branches of which are quite carpeted with primroses, and most satisfactorily they flower, and in a season like the present, when plants on open borders are withered up by the continuous parching winds, it is refreshing to look at these carpets of primroses—masses of delicate blossoms—under the friendly shelter of the drooping branches.

PRESENTATION TO MR. WILLIAM H. HEALE.—On the evening of the 7th ult. Mr. W. H. Heale was entertained by his fellow-members of the Perth Burns Club, in the Stormont Arms Hotel, and presented with a handsome album, on the occasion of his retiring from the management of the Perth Nurseries, and proceeding to Newcastle to fill the post of traveller and salesman to Messrs. Samuel Finney & Co., Newcastle. The chair was occupied by Mr. Farmer, President of the Club, the croupier's chair being occupied by Mr. Robert Sanson, vice-president. There was an unusually large attendance of the resident members.

ON BREEDING HORSES.—Generally in horses we want more vigour and muscular activity, combined with weight, large bone, and quietness, in carthorses, and with nervous energy, endurance, and lightness in the racehorse or thoroughbred. The form and qualities of the offspring depend partly upon both parents, and it is essential that the qualities of both should be taken into account, for de-

fects are more likely to be propagated in offspring than good qualities. There is, however, considerable difference of opinion as to the selective influence of sire and dam, some making out that the former and some that the latter is of most consequence. The Arabs appear to think that the selection of the mare is of supreme importance, while that of the horse is secondary.—From *The Fields of Great Britain*.

WHY ICE BREAKS DOWN TREES.—A gentleman recently had his curiosity aroused, while the trees were covered thickly with ice, as to the relative weight of the ice and the wood it surrounded. So he cut off a limb and found it weighed two and three-quarter pounds; after the ice was melted it weighed two ounces. Two hours later another trial was made; at first the limb weighed four and a half pounds, after the ice was removed it weighed three ounces. Another trial showed a weight of thirty-two pounds, while the limb alone weighed two pounds.

WHY THE PRAIRIES ARE TREELESS.—A curious and interesting explanation of the absence of trees on the great Western prairies is suggested by Mr. Thos. Meehan, who is of opinion that the absence of trees is due to artificial causes altogether. Taught by their necessities the early Indians made it a practice to annually fire the high grass of the prairies, which had the effect of making the growth more luxuriant and consequently more inviting to the vast herds of buffalo, on which the aborigines depended greatly for their sustenance. It has been conclusively settled that no vegetation, save the hardy prairie grass, will appear on ground over which fire has swept until another season, so that the yearly prairie fires extended the area of the plateau until they had become almost measureless. Mr. Meehan cited several instances where trees had grown when the fire had been discontinued.

THE BLUE GUM IN ALGERIA.—The death is announced of M. Ramel, whose name will ever be associated with the beneficent *Eucalyptus globulus*, or fever-destroying blue gum tree of Australia, introduced mainly by his means into Algeria and Europe. Twenty years ago there were spots

and whole districts in Algeria so fearfully unhealthy from miasma that alike colonists and Arabs were decimated by fever; and to travel through such regions at certain seasons of the year was like travelling through a pest-stricken country. By means of eucalyptus plantations, the seedlings springing in a few years to lofty trees, large tracts of the Metidja and the whole province have thus been rendered quite healthy.

A CURIOSITY.—Henry Seifer, of Belle Fontaine, Ohio, and his help cut down a large ash tree a few weeks ago for saw-logs. Embedded in the heart of the tree, thirty feet from the ground, they found, while sawing through, a well-preserved bone. Scientists, after examining it, say it is the thigh bone of a male human being, which has been in the tree for ages.

"MY GARDEN WILD" is the title of a new volume, which Messrs. Chatto & Windus will shortly publish, from the pen of Mr. Francis George Heath.

REMOVAL OF PURPLE BEECH.—Mr. Barron, of Borrowash, sends us a photograph of a noble purple beech, removed last October when in full leaf at Maresfield Park, Sussex, the seat of Lady Shelley. The tree, which weighed over 50 tons, was carried over a sunk fence from the garden in front of the mansion into the Park, a distance of about 200 yards. The height of the tree is over 50 ft., circumference of trunk 9 ft. 8 in., diameter of branches from north to south 52 ft. 6 in., and from east to west 46 ft. The square mass of soil and roots removed was 16 by 16 ft. and 3 to 4 ft. deep. The tree has withstood the winter gales with impunity, and the young growth, samples of which were enclosed, are quite satisfactory.—*Gardener's Chronicle*.

A MAINE TREE.—Recently a white pine tree was cut on the Milford Timber Tract, in Maine, U.S., which for size, length, soundness, and symmetry of proportion has challenged the eager lumbermen to produce an equal in the local forests of Maine. The circumference of the tree at the butt is 14 ft. (diameter 43 in.); at the top, as far as used, 33 in.; the length, between the above dimensions, 103 ft., scaling 3,559 ft. The tree was divided into six logs, the largest of which scaled 1,003 ft.

FIRE IN THE WOODS AT BRACKNELL.—On Sunday afternoon, the 15th May, a fire was discovered to have broken out in a plantation of trees by the side of the road leading from Bracknell to Caesar's Camp, at Southhill Park, the property of the Dowager Lady Hayter. A strong wind was blowing at the time, and, being Sunday, few hands could be got to extinguish the flames before a considerable portion of the high paling fence, and a quantity of fagots and firewood had been destroyed. Fortunately the trees in the plantation, being large, escaped.

QUERCUS SALICINA.—Although this oak is not likely to succeed in the open air in the British Isles except under exceptionally favourable conditions, the striking contrast between the light green of the perfectly smooth willow-like adult leaves and the dense glossy, blackish-purple silky pubescence of the young leaves and shoots, renders the species a desirable one for cool conservatory decoration. In a well-sheltered spot in the nursery in the Royal Gardens at Kew a set of nice bushy plants have been killed by the cold of the past winter. It is, however, being grown in the temperate-house. A native of Hong Kong, where, in the Happy Valley Wood, the only spot in the island where it has been seen, it attains a height of 40 ft.—*Gardener's Chronicle*.

THE BLACK WALNUT.—In Indiana the most valuable farms are the ones upon which the owners have protected the walnut, and they will become more valuable as the supply becomes more scarce. A man in that state recently refused 74 dol. a tree for his grove of fifty trees, which, says the *North-western Lumberman*, we look upon as a rich reward for simply withholding the axe for a few years.

FATAL ACCIDENT.—On Wednesday, the 11th May, Mr. C. C. Lewis, jun., deputy Coroner, held an inquest at the King's Head, Quendon, Essex, on the body of George Player, aged 64 years, a wood-ward on the Quendon Hall Estate. On Monday deceased was superintending the felling of a tree. When the tree was partly sawn through, it unexpectedly split up the middle, one portion of the trunk knocking the deceased over, and death ensuing in a few minutes. The

jury returned a verdict of accidental death.

WOODMAN KILLED NEAR TUXFORD.—

On May 14th an inquest was held at Babbington Springs, Tuxford, on the body of George Taylor, aged 65, a woodcutter, who was killed by being crushed by a falling tree, while at work on the previous day. It appeared that deceased with others was engaged in felling a large oak tree, and just as the bole was cracking and the tree about to fall he ran forward to pick up an axe, and before he had time to get out of the way the tree fell, hit him on the side of the head, and knocked out a piece of the scalp, killing him instantly.

THE OLDEST TREE IN THE WORLD.—

The *American Register* relates that in the vicinity of San Francisco a tree, which may justly lay claim to being the oldest tree in the world, was recently cut down on account of its debility, the rings on which denoted a period of vitality of no less than 4,840 years. Three hundred persons could freely move about in the hollow of the trunk just above the ground.

THE RAIN TREE.—This tree grows in some parts of South America to the height of 60 ft. with a diameter of 3 ft. at its base, and possesses the power of strongly attracting, absorbing, and condensing the humidity of the atmosphere. Water is always to be seen dripping from its trunk in such quantity as to convert the surrounding soil into a veritable marsh. It is in summer especially, when the rivers are nearly dried up, that the tree is most active.—*Land and Water.*

A PINE CONE EMBEDDED IN THE TRUNK OF A PINE TREE.—The *Deutscher Garten* records the fact of a sound cone of *Pinus sylvestris* having been found in the heart of the trunk of a tree of the same species lately felled. The cone was in a cavity nearly filled with resin, and was completely walled in—not a fissure, not a rent, was to be seen. It is estimated that it must have lain there from sixty to seventy years.

EFFECT OF THE WINTER FROSTS ON VEGETATION IN THE HIGHLANDS.—The

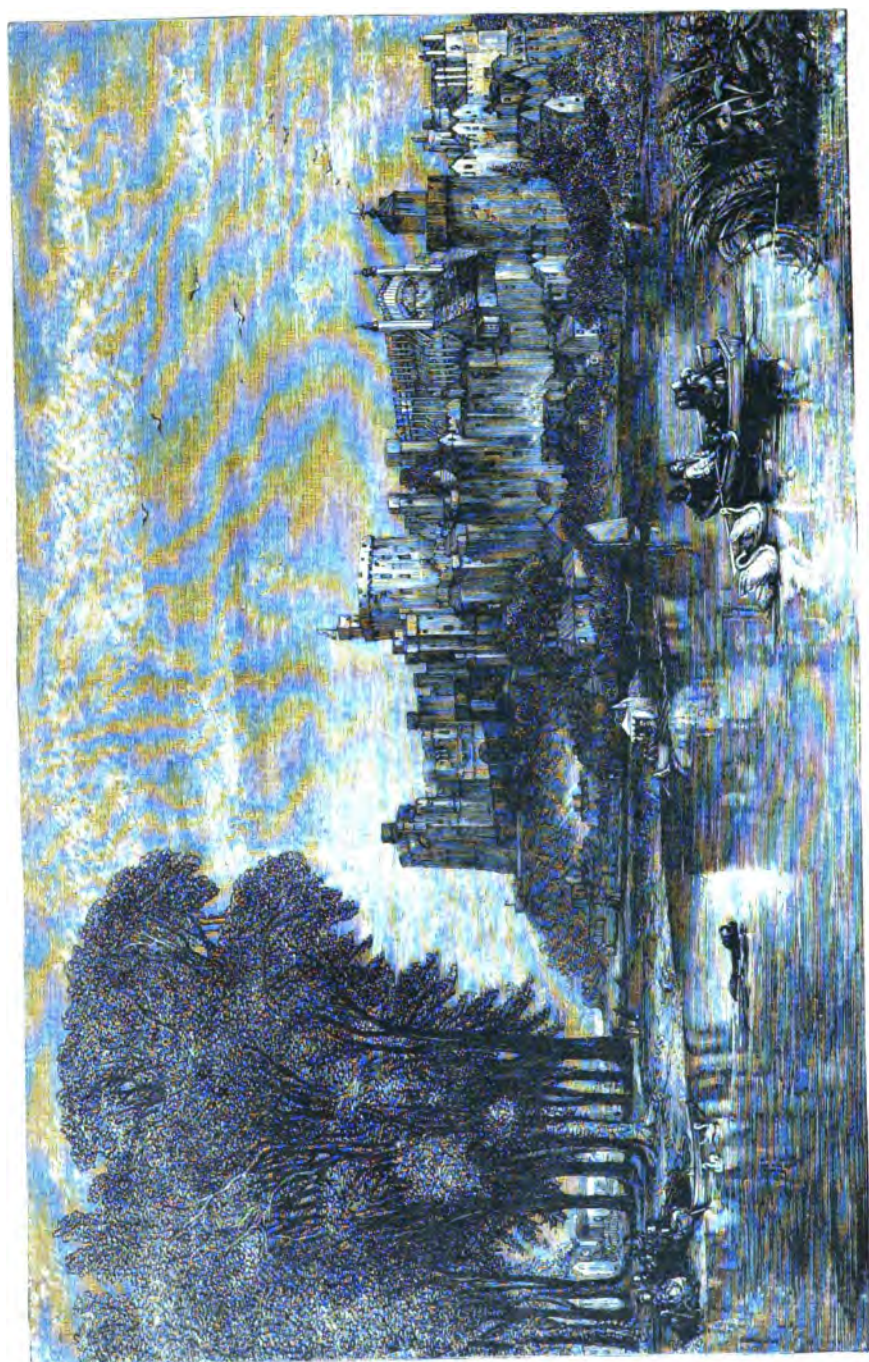
prolonged and unprecedentedly severe frosts of winter and spring have had a most disastrous effect on trees and shrubs in the Highlands. The dark green colour of the pine is everywhere broken by extensive reddish patches that tell of the excessive frosts. In a large plantation of young firs on the route of the Highland Railway every other tree seems completely blasted on the north-western side and presents a most peculiar appearance. The pendulous tresses of the birch are graced by scarcely a shade of green, at a time when the leaf is usually well developed, and the larch as a rule presents an equally bare and withered-like appearance.

FIRES IN PLANTATIONS.—On May 7th, a fire was discovered to have broken out in the plantation at Carmont Hill, on the estate of Dunnottar, Stonehaven, belonging to Mr. W. N. Forbes, and before it could be subdued the fire had extended over an area of about five acres, destroying the growing timber, which consisted of six year-old larch, Scotch fir, and spruce trees.

A large number of trees were destroyed by fire on May 8th, in Cookridge and Horsforth Woods, near Leeds. Some twenty-eight acres of ground suffered. The damage is supposed to be due to the careless use of matches.

On the evening of May 24th, about twenty acres of furze and fir trees, on Newtown-common, near Newbury, were destroyed by fire, and Newtown Rectory, the residence of the Rev. F. C. Gosling, had a very narrow escape. The fire is thought to be the work of an incendiary.

EXCRESCENCES ON TREES.—A writer in Hardwicke's *Science Gossip* says:—"About Enfield and Edmonton I have noticed several trees with a very remarkable protuberance at the bifurcation of the trunk. The trees appear as though they had swelled out tremendously, and the small shoots had sprouted all over the excrescence thus formed, but from what I can make out these twigs are caused by some parasite."



WINDSOR CASTLE FROM THE THAMES.

THE JOURNAL OF FORESTRY & ESTATE MANAGEMENT.

WINDSOR FOREST AND GREAT PARK.

THERE is perhaps no spot in Great Britain which Englishmen regard with greater love and interest than Windsor; this ancient home of Royalty and the surrounding district are so intimately associated with the history of our country that were Windsor Castle situated in the midst of a desolate plain or a marshy swamp it would still be a shrine towards which pilgrims from every nation would bend their willing steps. But when in close vicinity to the noblest Royal residence in the world we have the Forest and the Great Park, the silvery Thames, historic Runnymede, and classic Datchet, the "distant spires and antique towers" of Eton, and perhaps better than all, such a view of English landscape scenery as is to be obtained hardly anywhere else, it will be readily understood that Windsor is a place of which all Her Majesty's subjects are proud, and of whose beauties they are never tired of hearing.

In the following remarks we shall deal almost exclusively with Windsor Forest and Great Park, and we propose in the first place to give some idea of their former extent, and the history of their gradual enclosure and plantation; we shall then treat of the formation of the various plantations of which authentic records exist, with a few passing remarks on their present condition and management, and conclude by a brief allusion to some of the trees in the Park and Forest which are remarkable either for their antiquity, particular beauty, or from the fact of their having been planted by or named after royalty or other illustrious personages.

In dealing with Windsor Forest and Park it must be borne in mind that what is now known as Windsor Great Park is but a very small portion of the immense primeval forest which once covered a great portion of the counties of Bucks, Surrey, and Berks, and of which hardly any records now exist; it is said to have had a circumference of 120 miles. In the early part of the seventeenth century, according to John Norden the topographer's map, this extent appears to have been considerably reduced, and the circumference is then given as 77½ miles. The following is Norden's very interesting

definition of the Forest at that time (1602): "This forest lyeth in Barkshire and Surrey. It confineth Surrey, Hamshire, Barkshire, Oxfordshire, Buckinghamshire, and Middlesex. The Tam-ise bounds it north, the Loddon weste, Brodforde river and Guldowen south, and the Wye river easte." At this time, from the same authority, we learn that the Great Park, which was enclosed with a pale fence, had a circumference of $10\frac{1}{4}$ miles, and contained 3,650 acres, all within the counties of Berks and Surrey, while the open forest contained upwards of 24,000 acres.

During the 200 years following the reign of James I. the "commoners" seem to have successfully carried on the tactics of what



VIEW OF WINDSOR CASTLE FROM THE GREAT PARK.

appears to be the peculiar characteristic of the *genus* all the world over, and what with their encroachments on the one hand and the depredations of the various persons who claimed "rights," the Lord Chief Justices in Eyre, who had the power of prosecuting all offenders against forest laws, seem to have had a busy and disagreeable time of it. At all events, without dwelling longer on what is neither an instructive nor an edifying portion of the Forest history, we may state that the disputes as to forest rights towards the beginning of the present century were so numerous and waxed so warm that the

necessity became apparent to all concerned of allotting a separate portion to each claimant, instead of allowing a great number to have ill-defined rights over the whole. One incident related by Mr. Menzies in his very valuable work, "*The History of Windsor Great Park and Forest*," will serve to show the manner in which these "rights" were enforced, and to demonstrate at the same time the state of things which the Forest Enclosure Act of 1813 was called upon to suppress. "An Old Commoner has described to me, with evident self-congratulation, how, one moonlight night on Christmas Eve, when the forest officers were tapping their elder wine (a custom which still exists) and not likely to disturb him, he worked all night long, and had a quarter of an acre added to his land before morning. A moonlight night was the season for such operations; if a commoner could only build himself a hut of turf and have a fire lighted and a *pot boiled* on the rudest chimney, the hut became established as a house—was, in fact, his 'castle,' and was wholly unassailable except by regular process of law, which the forest officers frequently declined to institute: the trouble was immense, there was no remuneration, and the next moonlight night saw the estate restored. If, however, the pot had not been boiled on the hearth, the forest officers might proceed without ceremony to pull the place down."

It was, then, to remove such customs as these, as well as to put an end for ever to the frequent disputes, that the Commissioners were appointed to make a report on the state of the forest, which they did in 1807, and again, finally, in 1808. Their report was a sweeping condemnation of the laws (which were, in effect, practically useless) under which the Forest was then governed; in 1813 the Act for the enclosure of the Forest was passed, and in 1817 the awards to the various commoners were made, the Crown obtaining complete possession of a large part of land stretching from New Lodge to Sandhurst, containing upwards of 10,000 acres. With the exception of that part belonging to the Crown adjacent to the Great Park, known as Cranbourne, scarcely a vestige of the grand old forest now remains.

Turning now to Windsor Great Park, as distinguished from the Forest, our subject, from an arboricultural point of view, becomes a much more interesting one, and thanks to the energetic researches made by the late Deputy Surveyor, under the able guidance of the Hon. Chas. Gore, who still worthily fills the office of one of Her Majesty's Commissioners of Woods, the date and history of most of the plantations formed since the reign of Queen Elizabeth are now recorded. The date when the Great Park was fenced in from the open forest is not known, but in the records extant the date of the first regular plantation is ascribed to the reign of Queen Elizabeth, although it is

probable that there had been enclosures, and some attempts at a system of reproduction long before that time. Certain it is that during the reign of the Virgin Queen, whether through a fear of the Spanish Armada or from some other cause, anxiety began to be displayed as to the supply of navy oak timber, and in the twenty-third year of this reign an Act of Parliament was passed whereby the regulations for cutting copsewood were very strictly laid down, and it was also enacted that twelve "standels or storers" should be left on every



"HERNE'S OAK" CUT DOWN ABOUT 1796 (*page 155*).

acre of wood cut. There is also allusion made in a document of the year 1625, to thirteen acres within Cranbourne Walk which had been fenced into the Great Park pales, and sown with acorns in 1580, "which is now become a wood of some thousands of tall young oaks, bearing acorns, and giving shelter to cattle and likely to prove as goodly timber as any in the kingdom." Mr. Menzies assumes that the plantation here referred to is the large group of oaks stretching from the back of the Park Bailiff's house, in the direction of Cranbourne; his reasons for this belief, which we think are perfectly conclusive, are

that the oaks are of a singularly uniform character, that they are all maiden trees, that the extent very nearly tallies with that indicated, and that there are a few apparently older pollarded trees amongst them. The trees at the present time are perfectly healthy, stand about 21 to the acre, and their average contents are about 88 ft. This, we believe, is the earliest authenticated record of any regular plantation known to have been made in England. In 1608 an important proclamation was made by James I., ordering "all care to be taken of



"HERNE'S OAK" BLOWN DOWN IN 1868 (*page 155*).

woods and the preserving of stemmers when they fell their coppices," and rangers and other persons are warned not to be "wasteful," nor are they to "head or shred any timber or trees," but "to take only such loppes for browse as has been usually lopped." This order seems to have been so far obeyed, insomuch that since the date of it the practice of pollarding oak and other trees seems to have been discontinued. Between the years 1640 and 1660 many of the older plantations in the Park were probably fenced in with a ditch and bank, and between 1662 and 1680 these plantations were planted up. About the year 1675 the great avenue of oaks from Bishop's Gate to Cumberland Lodge was planted, Mr. May being ranger at that time, and within a few years—Mr. Menzies fixes the date at 1680—the planting of the Long Walk was commenced, and was probably completed in about three years. To those persons who are so unfortunate as never to

have seen this magnificent avenue, probably unsurpassed in Europe, it is difficult to attempt to convey an adequate idea of its beauty. Whether we admire its grand proportions, its pleasing regularity, or the grandeur of the individual trees, we feel that we are contemplating a masterpiece of the planter's art, a glorious work in which science and nature have united their best efforts to charm and to instruct. The length of the Long Walk from the Castle to King George's statue on Snow Hill is $2\frac{1}{2}$ miles, and is bordered with a double row of elms, and in some places oaks; there were originally 1,652 trees. The width of the avenue is 150 ft., and the distance between the trees 30 ft., the same space separating the rows. For many years the old trees have been failing fast from natural decay, and on the question of the best system of replanting there has been much discussion and difference of opinion. In 1859 a commission consisting of the Duke of Bedford, Mr. Ralph Sneyd, the Hon. Chas. Gore and Mr. Clutton, was appointed to investigate this knotty point, and, after much discussion, it was decided that the best system of renewal would be to cut gaps several yards in length in places between the statue and the double gates, and plant them with oaks, and to replant with elms the worst spots between the double gates and the Castle. Near the statue an enclosure was made in 1861, and planted with oaks as recommended by the commission. These trees have thriven so well that it was decided in 1879, to form three further plantations upon the same plan, all of which are now doing remarkably well, and giving promise of making fine timber trees. We remember at the time these old elms were cut down there was a good deal of talk about the destruction of the "fine old trees," and such terms as "Goths and Vandals" were pretty freely bandied about, but the sight of a trunk of one of the old fellows which we saw in the Park timber yard, a hollow shell, with hardly a foot of timber in it, was quite enough to convince us, not only that they were long past maturity, but that it was absolutely dangerous to life to allow them to stand longer. Besides, would it not be both selfish and ungrateful for us to have all the enjoyment of this splendid legacy from those who planted these grand old trees with so much care and skill, without doing anything to preserve them, or at least to replace them for the benefit of those who come after us?

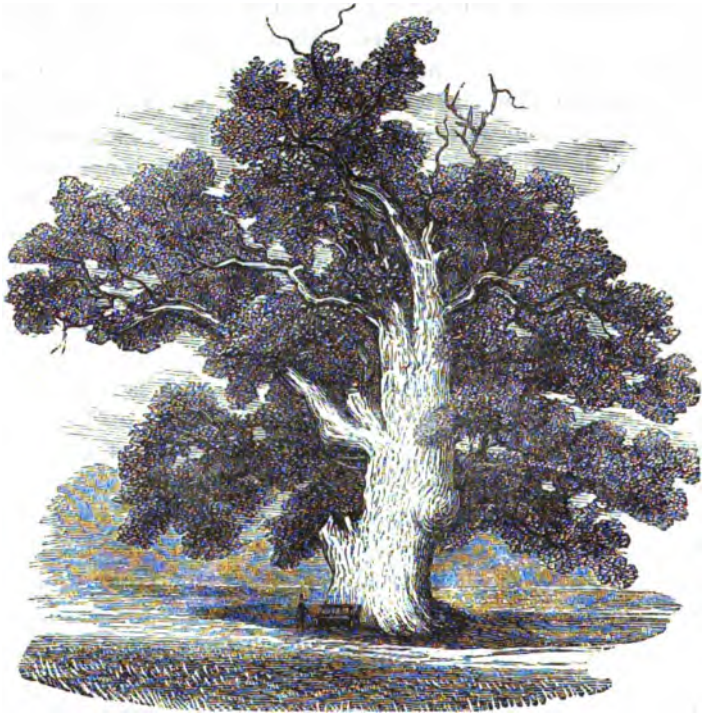
During the period from 1680 to 1730 the records of the work in the park are very scanty, and, with the exception of some notes by Evelyn (who visited Windsor several times during the first part of this period) are derived principally from letters of the Duchess of Marlborough, who succeeded William Earl of Portland in the rangership in 1702, and continued in that office until her death in 1744. To return for a moment to this long period, we

may mention an oak plantation of about 14 acres, between Bishop's Gate and the road leading to Blacknest from the top of the Long Walk, planted in 1693, which we may take as a very good specimen of a 200 year old oak plantation. Mr. Menzies in his book states there are (1864) 32 trees to the acre, with an average contents of 104 cubic ft., and an average girth at 5 ft. of 7 ft. 2 in.; the girth of the largest tree is 11 ft. The soil is a fine light loam, with a clay sub-soil, and the ground appears to have been trenched. The trees are all perfectly sound, healthy, and growing fast, and we should say we are within the mark if we estimate the value of the timber in this plantation at between £5,000 and £6,000. About 1707 Queen Anne's Ride was planted, at first with elms, but subsequently, the elms not succeeding well, with other trees, and at the present time some renewals are being made here by planting limes, which are well suited to the soil, in place of the chestnuts, which have never made a satisfactory growth. About the year 1718 the plantation lying between Cumberland Lodge and Cow Pond was formed, and we mention it simply because it contains what is generally considered to be the most perfect timber tree in Windsor Park. It is an oak with a straight clean bole over 40 ft. up to the first branch, with a girth of 10 ft. 4 in. at 5 ft. from the ground, and is perfectly sound and growing vigorously. The contents cannot be less than 180 ft., and we were told that a timber merchant offered the sum of £100 for it.

About the year 1746, when H.R.H. William, Duke of Cumberland, was appointed ranger, we enter upon a period of great activity in the Park, and a number of plantations appear to have been made, which, however, it is not necessary for our present purpose to describe in detail; we merely mention that Scotch firs and larch and cedars of Lebanon are first mentioned as having been planted about this time in the Park.

In 1766 Henry Frederick, Duke of Cumberland, became ranger, and numerous plantations, chiefly of oaks and chestnuts, were formed, and about this time a commencement was made in the formation of that magnificent lake now known as Virginia Water. It was not, however, till 1780, when a great flood carried away part of the banks of the existing lake, that it was decided to increase it to its present vast dimensions; the work was carried out under the superintendence of Mr. John Pitt, Surveyor-General of Forests, and was finally completed in 1790. Virginia Water is generally credited with being the largest artificial lake in Great Britain, or at least shares that honour with the magnificent sheet of water at Blenheim: be that as it may, it covers an area of some 150 acres, and is certainly unsurpassed in beauties, both of nature and of art. We do not intend here to enter into any minute description of the scenery or the scenic effects, if we may so

term them, with which the lake abounds, and which have been unduly exalted by some writers and petulantly criticised by others. The chief beauty of Virginia Water, to our mind, is derived from its irregular shape, from the magnificently wooded acclivities which form its banks, and from the suddenness with which these banks rise almost from the edge of the lake, completely shutting out the world beyond. The broad green ride of springy turf which runs along both



QUEEN ELIZABETH'S OAK (page 155).

sides of it is a very pleasing feature in the landscape, and the trees are in some places so close to the water that their branches may be seen gracefully dipping into it. The Greek and Roman columns forming the "ruins" are attributed to Sir Jefferey Wyattville, and although their presence in the midst of this particularly English scene is by some considered an anomaly of the deepest dye, the effect of them, now that their colours are toned down by the growth of moss and ivy, which in some places nearly covers them, is not displeasing; and it must, moreover, not be entirely overlooked that they are not altogether a "sham," a large portion of the materials of which they are composed having been obtained from Tripoli in North Africa,

the remainder being from the Elgin collection. The royal barge anchored in the Bay, Fort Belvedere, and the Fishing Temple, are other features of Virginia Water which our readers can examine in detail for themselves when next, with an appetite whetted, we hope, by our brief sketch, they devote a day to the enjoyment of the beauties of Windsor Forest and Park.

To return to our sketch of the history of the Park, we find that after the death of Henry Duke of Cumberland, in 1791, King George III. took the rangership into his own hands, and appointed as deputy Major-General William Harcourt. Mr. Kent, a land agent, seems to have had much influence in all the alterations and improvements which were carried out in the Park during these years, but his chief attention was given to farming operations, and, with the exception of the Horseshoe Plantation and a few others, we do not find much work done in the woods. We must not, however, omit to record that about this period (1797) the magnificent *Rhododendron Ride* was planted. Mr. Kent, too, made a careful survey of the timber in the Park in 1814, in which he states that (independent of young plantations under twenty years of age) there were nearly 50,000 trees, containing about a million and a half cubic feet of timber. From 1815 to 1825 was a period of great activity in the Park, caused by the recent enclosure; roads had to be made, and the land recently acquired by the Crown to be planted, oak being used wherever the clayey nature of the soil seemed to promise a good growth, and Scotch fir and other trees in various places.

In 1830 King William IV. became ranger, with Sir W. H. Freemantle as deputy, but the very heavy outlay incurred during the previous ten or fifteen years seems to have tightened the purse-strings of the exchequer, and for the next twenty years there was very little money forthcoming for improvements or planting. On the death of Sir W. Freemantle in 1850, Major-General Seymour was appointed deputy ranger. The Board of Woods and Forests at that time becoming separated from that of Works and Public Buildings, Windsor Forest and Park came under the individual care of the Hon. Charles Gore, to whose intelligent management and sound practical judgment during the long period of thirty years is in no slight degree attributable the high state of efficiency in which this magnificent property is now to be found. The Prince Consort, immediately after Her Majesty's marriage in 1840, became ranger, and from that time till his lamented decease in 1861 he displayed, as is well known, the greatest possible interest in the maintenance and improvement of Windsor Park, and the comfort and happiness of all those employed in it.

It was in 1849 time that the woods and plantations came under the charge of Mr. Menzies, to whose "*History of Windsor Park and*

Forest" we are so much indebted for the material for this present sketch. The compilation of the work itself occupied some years, and the industry and care displayed by the author in examining old records and MSS. scattered in various parts of the country would be highly creditable in a man whose sole profession was authorship, but shown by a man actively engaged in the management of a property of 14,000 acres, they become almost incredible. There were numerous small plantations made during Mr. Menzies' deputy-surveyorship (1849 to 1878), amongst which were the Seymour Plantation (1852), Prince



WILLIAM THE CONQUEROR'S OAK (page 157).

Consort's (1856), Albert (1861), Gore (1864), Queen Victoria (1866), Prince Christian (1868), Princess Christian (1869); but of all Mr. Menzies' works the one which the public at large will thank him most for, and the good effects of which will live longest, was the fixing of the date of the various plantations, and marking them with iron pillars, thus enabling us to learn many valuable lessons, which without such accurate data would be nearly impossible.

The present control of the management of Windsor Park rests with the Ranger, H.R.H. Prince Christian, who constantly resides at Cumberland Lodge, and takes the greatest possible interest in all matters

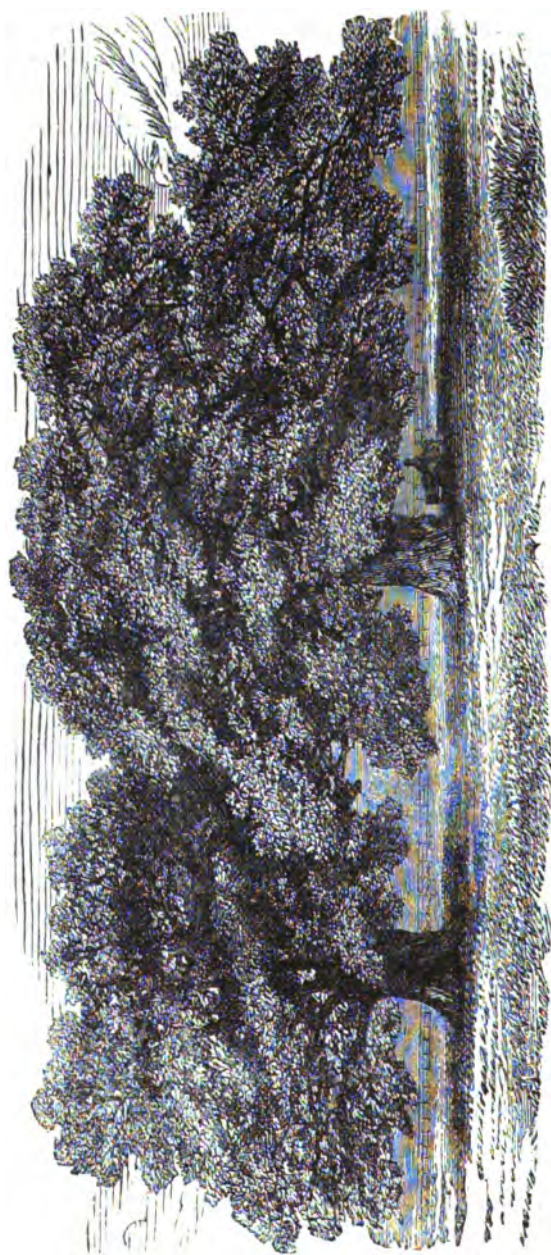
relating to the Park, and confers with Her Majesty, when necessary, on questions of improvements and alterations. Colonel the Hon. A. Liddell is deputy-ranger. The Hon. Charles Gore, as a Commissioner of Woods and Forests, has charge on behalf of that Department of all matters connected with the estate, and his long experience in that capacity is still invaluable. The deputy-surveyor, Mr. F. Simmonds, was for many years assistant to the late Mr. Menzies, and succeeded him on his death in 1878. Of him we cannot say more than that he is worthily treading in his predecessor's footsteps.

Passing on now to notice briefly a few of the most celebrated trees in the Forest and Park, selected almost at random from a very large number, on which, did space permit, we could dwell with pleasure, we will first allude to Herne's Oak, which is, or rather was, for it is no longer standing, supposed to be the tree immortalised by Shakespeare, in the "*Merry Wives of Windsor*" (Act iv, scene 4), as the scene of Herne the Hunter's terrible exploits.

"There is an old tale goes, that Herne the Hunter,
Sometime a keeper here in Windsor Forest,
Doth all the winter-time, at still midnight,
Walk round about an oak, with great ragg'd horns;
And there he blasts the trees, and takes the cattle,
And makes milch kine yield blood, and shakes a chain
In a most hideous and dreadful manner."

Some years ago a sharp controversy was carried on as to the identity of Herne's Oak, it being contended by some authorities that it was cut down, in error, during the reign of George III.; however, as both the rivals for the honour are now laid low, it matters little to discuss their respective claims, and the illustrations at pages 148 and 149 will give our readers a good idea of the character of the two trees, one of which was doubtless the veritable Herne's Oak. The last surviving tree was blown down in September, 1863, having fallen into utter decay, and a small portion of the wood from it is now converted into the case of a book, carefully preserved in Mr. Simmonds' house. By command of Her Majesty, another tree was planted in its place, and a memorial stone placed beside it.

Close to the site of Herne's Oak, in the Home Park, we come across a couple of very fine old oaks, apparently from 800 to 1,000 years old, called respectively Queen Elizabeth's (illustrated at page 152), and Shakespeare's Oaks, which tradition has handed down as being favourites with the great Queen and Poet. Neither must we forget to mention two remarkably fine evergreen oaks, of which we give an illustration, the two having a spread of branches of over 330 ft. in circumference. Another interesting tree in the Home Park

EVERGREEN OAKS IN THE HOME PARK (*page 155*).

is Luther's Beech (see page 158), which we learn, from a tablet placed underneath it, was raised from the beech tree near Altens tein, in the Duchy of Saxe Meiningen, called "Luther's Beech," under which Dr. Martin Luther was arrested, and conducted thence to the Wartburg, in 1521. The little off-shoot was brought to England from Meiningen by King William IV., when Duke of Clarence, in 1825, and planted by Queen Adelaide near the house at Bushey Park. Her Majesty bequeathed it in her last will to H.R.H. Prince Albert, with the request that it might be transplanted into the enclosure at Adelaide Cottage, Windsor Home Park, which was successfully done in 1850. The original tree was destroyed by lightning July 18, 1841.

Another remarkable old tree is William the Conqueror's Oak, although, beyond the fact that it has been associated with the Norman's name from time immemorial, its history is unknown. This old monarch of the forest, of whose present appearance our illustration (page 154) gives a good idea, is situated near Cranbourne Lodge, just inside the Park palings, and is consequently but little known to the public. It seems to us a pity that, when the diversion of a few yards of paling would make this rare piece of antiquity accessible to the notice of any one who chose to come and look at it, it should be so carefully hidden away. Perhaps the Ranger may think our suggestion worthy of consideration. The tree, which is estimated to be from 1,200 to 1,500 years old, is 37 ft. round the trunk at 5 ft. from the ground, and although the main stem has long been utterly decayed, and is supported with props, some of the side branches seem to have absorbed all the strength of the roots, and are still green and full of vigour. There is another old veteran in the forest a short distance from this tree, of apparently nearly equal antiquity, with a girth at 5 ft. of 34 ft. 6 in.

There are many other grand old trees scattered through the Forest and Park—the old pollard oak at Forest Gate, for instance, 28 ft. 4 in. in circumference; the old beeches, also pollarded, on Smith's Lawn, one of which has the enormous circumference at 5 ft. of 31 ft. 9 in.; and the magnificent oak, 100 ft. high, near the Royal Chapel, as well as the glorious cedars in Belvedere Wood, many of which, doubtless, could tell a tale, and who, during their centuries of life, have seen and stored up in their "high tops, bald with dry antiquity," some famous scenes and sights, of which even the tradition has now faded out of memory. However, without seeking to pry into their secrets, or worse still, drawing on our imagination for what we cannot know, we will now proceed to mention a few of the modern trees around which there rests a halo of even greater interest than belongs either to the antiquity of William the Conqueror's Oak, or the superstitious dread of that of the terrible Herne.

In the forest, between Highstanding Hill and New Lodge, there are four trees, which have received the distinction of having been chosen as "royal favourites;" Queen Anne's, Queen Charlotte's, Queen Adelaide's, and Queen Victoria's; the first two and the last oaks, and the third a beech. Queen Adelaide's Beech is about 50 ft. in height, 8 ft. 6 in. in circumference, and is probably nearly 160 years old; it is represented in the engraving at page 161; the spot is doubtless



LUTHER'S BEECH (*page 157*).

more famous for the superb view of Windsor Castle obtained from it than for the beauty of the tree itself. The dimensions of Queen Anne's, Queen Charlotte's, and Queen Victoria's Oaks are as follows, in the order named—60 ft. high, 15 ft. 3 in. in circumference, at 5 ft. up, age about 420 years; height, 65 ft., girth, 17 ft. 3 in., at 5 ft., probable age, 460 years; height, 70 ft., circumference at 5 ft., 11 ft. 11 in., probable age, 250 years. The latter—Queen Victoria's Oak—is perhaps as handsome a specimen

of a thriving "young" oak as it would be possible to find. It has a magnificent straight stem 38 ft. up to the first bough, and a beautifully rounded head; it was chosen by Her Majesty as her favourite soon after her accession. Each royal tree bears its title on a metal plate. Our space is drawing to a close, or we could ramble on for ever almost amongst these interesting landmarks of time; but before concluding we must mention one tree which, as long as it stands, and the noble deeds of its illustrious namesake are remembered, will be regarded with affectionate interest. The Prince Consort's Memorial Oak, planted by Her Majesty on November 25, 1862, marks the spot where her much-loved husband finished his last day's shooting on November 23, 1861.

On the subject of the present management of the Forest, we have but a very few remarks to make, for Windsor Park as a Royal demesne is maintained for the enjoyment of Her Majesty and the public generally, and it is for ornament and pleasure, and not for profit, that timber is grown here. Nevertheless, we find in all departments of the estate, traces of careful and economic management, and as far as new plantations and replantings are concerned, a studied desire to plant only such trees as are known to be suited to the various soils and situations. Neither must we omit to mention our visit to the Prince Consort's workshops, erected under the superintendence of His Royal Highness, in 1861. In these works about forty men are employed in carrying out the various repairs and improvements on the estate, and also in building operations of some magnitude under the direction of Mr. Street, the clerk of the works. Amongst the latter we were shown a very neat and substantial residence in course of construction, for Mr. Bartlett, the foreman of the Park, and a handsome little red brick bridge, leading into the gardens of the Fishing Cottage at Virginia Water. The workshops, which cover a large area, are substantially built and admirably designed. In the spacious joiner's shop, we noticed a saw bench and circular saw by Robinson, a mortising machine, Ransome's saw sharpener, and other machinery, the whole driven by underground belting, from a 14-horse power engine by Clayton & Shuttleworth; there is also a turbine water-wheel, which is used in cases of emergency, or when the work is not sufficient to start the engine. The arrangement of the machinery was carried out by Messrs. Easton & Anderson, who also provided the engine and turbine for the Park waterworks. The other buildings consist of a smithy, painters' shop, drying sheds, store rooms for wood, ironmongery, grates, &c., paper-hangings, ropes, paints, and a variety of stores too numerous to mention, but which are all necessary and useful on a large estate, where everything has

to be kept in first-rate condition. The stables, which are capitally appointed, contained, at the time of our visit, seventeen horses, all of which are in regular work about the place, and looked strong, serviceable animals. There is also a fire-engine kept constantly ready in case of emergency. It will give some idea of the extent of the operations carried on in these workshops, if we mention that the value (on the ground) of the wood cut up annually for estate purposes is upwards of £500.

Not only in the workshop we have just been describing, but throughout the estate the visitor is struck with the great attention that is given to the comfort and well-being of the men employed, of whom there are about 180 in all. It is well known that this was a subject to which the Prince Consort devoted special attention, and his views on these matters seem to have been transmitted to his successors. Not only are the men's cottages, let at 2s. 6d. per week, patterns within and without of neatness and comfort, but in all the smallest details we observed a desire to promote the happiness of the men, and to secure that harmonious working together which is so necessary in large establishments. In times of sickness the men are allowed one month's pay by the Crown, but to supplement this Mr. Simmonds has inaugurated a sick fund, which, by the small contribution of one penny per week from each man, has been able—as the last report issued by the hon. sec., Mr. W. Menzies (son of the late deputy-surveyor), informs us—to pay since its commencement in November, 1878, the sum of £62 18s. 8d. for relief during illness and for funeral expenses, and has a balance in hand at the present time of £25 15s. 5d. We were informed that the piece-work system is adopted wherever possible.

All the recent plantations which we visited—notably Prince Consort's *Cedrus deodara*, *Wellingtonia gigantea*, and other ornamental pines; Queen Victoria's (1866) mixed, copper beech and larch, and the Prince of Wales', (1880) larch, Scots fir, with evergreen oak for the permanent crop—showed traces of careful management and were, with very few exceptions, making good healthy growth.

Nothing more now remains to be said, excepting to express our gratitude to all the officials connected with the Park for their kind assistance in our pleasant task, and particularly to the deputy-surveyor, Mr. F. Simmonds, who has shown the greatest possible interest in our work, and has aided us not only by referring us to several important works and documents connected with the Forest, but also personally by assisting us in taking measurements and making observations. To the proprietors of *The Gardeners' Chronicle* we are indebted for kindly lending us several of the illustrations with which this article is embellished, and which were prepared by them at great

expense for their own use some years ago ; and finally we must again acknowledge the very great assistance we have derived from that most valuable book, "The History of Windsor Great Park," by the late Mr. William Menzies.



Ed. Longfield

WINDSOR CASTLE, FROM QUEEN ADELAIDE'S TREE (page 158).

THE PHEASANT.

ITS ORIGIN AND SPECIES ; TREATMENT IN COVERTS AND IN PENS ;
SITTING, HATCHING, AND REARING ; DISEASES ; COST OF REARING ;
SHOOTING.

1. *Its Origin and Species, &c.*—The Pheasant belongs to the order of birds called *Gallinæ* and *Rasores*, and to the genus or group named *Phasianus*, of which there are no less than thirteen species. All disputes as to the origin of the name of the common pheasant—*Phasianus Colchicus*—are summarily disposed of and conveniently settled by the assertion that it was brought from the banks of the river Phasis, in Colchis, by Jason of the Golden Fleece, and the Argonauts who accompanied him : and a more befitting cargo than this beautiful bird with

“ His gorgeous purple, gold, and green,”

the good ship *Argo* could not have carried. The whole group is distinguished by long tail-feathers, which in the Reeves pheasant are five to six feet in length.

The best known species are those which are adapted for rearing in coverts, such as *P. Colchicus*, *P. torquatus*, or the Chinese pheasant ; *P. versicolor*, the Japanese ; *P. Reevesii*, or Reeves's pheasant, and *P. Sömmerringii*, or Sömmerring's pheasant, all of which are very closely related. Besides these, we have the Golden Pheasant, the Silver, Amherst, the Eared, the Impeyan, and the Argus Pheasants, which are better adapted to the aviary.

The common pheasant is too well known to need description. Its bright eye with yellow iris, and scarlet rim with black specks, dark and almost black feathers, mixed with shining purple on the fore part of the head, and dark-green shining silky feathers on the top of the head and upper part of the neck, mixed with others of brilliant blue, —these colours ever changing as the bird shifts his position—are familiar to all sportsmen, and even to common observers.

However introduced, it is certain that the pheasant has been for many centuries common in England. Harold's bill of fare for the Canon's household, drawn up in the year 1059, contains the words *aut unus phasianus*. Echard, also, states that in 1299 a pheasant was valued at 4d., two woodcocks or one mallard at 1½d., and a plover at 1d. Camden, in his *Britannica*, mentions “ fasant hen and fasant cocke.” And who, in these latter days, shall contradict the pleasant legend, that just before his martyrdom in 1170, Thomas à Becket had dined off pheasant, and enjoyed it much ? A celebrated divine who lived at the beginning of the thirteenth century, represents pheasants and other choice birds as peculiarly adapted to the use of

the clergy, with whose glorious bodies incorporated, they might be raised to heaven, and not go down with impious devourers to the lower regions. Sidney Smith, also, in later times, speaks of the eating of pheasant with plain bread sauce as amongst the greatest of table pleasures.

"The pheasant of beech-copse peerless denizen" has supplied a theme for the poet and furnished a choice dish for the *gourmet* from early times. Besides being a thing of beauty and a joy to the sportsman while living, it may when dead be enjoyed alike by the strong or the weak; and a modern writer enumerates among its many other good qualities the crowning one that pheasant may be accompanied by almost any kind of wine, provided the wine be really excellent in itself.

The hen pheasant, which is unmistakably the best eating, weighs generally from 2 to 2½ lbs., and the cock from 3 to 3½ lbs., though cocks have been shot which weighed upwards of 5 lbs.

2. *Treatment in Covert.*—This bird in its wild state prefers the wide-spreading hedgerow, the tangled masses of underwood near a stream, and the smaller woods or the margins of larger ones, to the depths of the forest. From the first of these it can stroll out at leisure upon the stubble, the fallow, or the young crop, to pick up its favourite food. Its *menu* is an exceedingly varied one, including both animal and vegetable foods, and choice esculents and fruits. It devours acorns, hazelnuts, beechmast, Spanish chestnuts, grain of almost any kind, hips and haws, the seeds of sedges and grasses, the keys of ash and sycamore, worms and slugs, the eggs or larvæ of ants, grasshoppers, snails, the tubers of buttercups, roots of the silver-weed, the lesser celandine or wood-ranunculus, fern roots, grass, young clover and tares, herbs of various kinds, wild cress, the pimpernel, elderberries, wild strawberries, mistletoe, and, when it can make its way into the garden, apples, pears, plums, and almost any fruit. It attacks and eats up field mice, and even the slowworm has been found inside a pheasant. Its very strong and blunt claws are well adapted to scratching out and digging up its food, and the sharp beak for cutting it in pieces.

One fact which should commend the pheasant to the consideration of the farmer, by whom it is often looked upon as an enemy, is this—that it is a large destroyer of wireworm, as many as 1,200 of these, or half a pint by measure, having been found at one time in its crop. The crop is never without gritty substances, small stones, or sand, all of which are readily ground down by its internal mill—the gizzard. Finely crushed bones are very readily devoured, and of great service to the pheasant.

In its wild state the cock pheasant is polygamous and remarkable for its salacity. It sometimes pairs with the black grouse, the guinea

fowl, the domestic hen, and even with the turkey. A proper proportion of birds in the woods is one cock to three hens, this being found to produce the most fertile eggs. The number of eggs laid is generally from nine to fourteen; and though many more may be found in one nest, these are generally the produce of two or more hen birds. Indeed, it frequently happens that the nests are of a very composite character, both pheasants and partridges, and even the common fowl, resorting to the same. And when hatched off together the two former may be found side by side in September. Hen pheasants have been known to lay in an old squirrel's hutch, or in a wood pigeon's nest, and to bring the young safely down. They are also fond of making their nests in clover or tares adjoining coverts.

The laying of pheasants is greatly dependent on the supply of food and the mildness of the season. The earliest eggs have been picked up by the middle of March, but they have been known to hatch off in a wild state at the beginning of May, and in Devonshire even in April. At the commencement of the season the hen seldom lays oftener than every other day, and a return of cold weather in April or May seriously interferes with the number of eggs.

The success of pheasant preserving in a wild state must depend mainly upon the abundance of good covert and the absence of vermin. Its enemies are so numerous that we can only briefly allude to them. First and foremost stands the poacher—capacious of pocket, fleet of foot, sharp-sighted, and cunning as a fox. Let no such lean-visaged mortal be trusted within the cover's precincts. Under various pretences he hangs about the outskirts of the wood, and makes sudden and unexpected raids in the interior; the female guardian of his Spartan cart or other vehicle standing in the lane, looking meanwhile the picture of innocence. His booty obtained, he drives off rapidly, a slight covering of rushes concealing a multitude of eggs, birds, or ground game. Next come crows, rooks, magpies, jackdaws, and hedgehogs, all of which are noted depredators. Rooks attack the nests or young birds, mainly after a long drought, when animal food becomes scarce. Cats, foxes, polecats, and even moorhens carry away young birds, and hawks hover around at intervals. Even the little butcher bird is fond of pheasant. Weasels and stoats should receive no quarter.

The formation of good pheasant cover is a subject which calls for notice. Silver and spruce firs are undoubtedly the best, and the Scotch pine, when kept fairly thinned, and intermixed with hard woods, is useful; allowed to grow up too thick it forms a mere canopy. Hollies, Portugal and common laurels, yews, privet, mahonia, and the barberry, make a good undergrowth. The cocks roost higher up than the hens, and for these an intermixture of oak or

birch is recommended. The rough and horizontal branches of larch are favourite places with the birds, who can here obtain good foothold. But their bareness in winter betrays their occupants. Here a good sprinkling of mock pheasants, either of wood or twisted hay-bands, will be desirable. In counties where the underwood is luxuriant, the poacher has less chance.

Proper mixtures of food, and regular times of serving it, in sheltered and partially obscured tracks, will keep the birds together and defeat the artifices of the wood-pigeons and smaller birds, always eager for grain. Maize may be looked upon as the *pièce de résistance* of the pheasant feeder—this being preferred by the birds to almost everything else which is placed before them.

3. *Pheasants in Pens.*—To secure a good stock, catch up yearling birds at the end of August or the first week in September. These should be placed in dry pens upon sound turf, and with either a sandy or a chalky substratum, the surface sloping a little so as to throw off rain water. Such pens may consist of close wattled hurdles or thin boards run up to a height of about 4 ft. 6 in., the remainder being composed of galvanized wire netting, making the entire height about 10 ft. If the birds are pinioned, or have their wings clipped, the tops may be open; otherwise they should be closed in with strong garden netting, as the rigid wire netting often does great injury to birds rising suddenly from fright. Pens intended to hold six birds—one cock and five hens—should not be less than 20 ft. square. A few brushwood faggots placed in a corner afford shade and shelter, and if two or more are placed in the centre of the pen, leaning together at the top, they form a useful perching place. Sometimes the tops of the pens are left open and the service of wild birds is relied on. But unless wild cocks are numerous and the pens favourably placed this is a very risky experiment.

The feeding of birds in the pens should, especially during the laying season, assimilate as much as possible to their food in a wild state. Rice and crissel boiled together may afterwards be mixed with meal containing equal portions of maize, barley, and wheat. If this be liberally supplied in the morning, the evening meal may consist of whole maize and soaked wheat. The water should be constantly changed and the drinking vessels kept perfectly clean by frequent scalding. Plenty of clean sand and dry road grit may be thrown in from time to time, with some crushed bones.

If the pens are to remain for more than one year in the same place, the birds should be temporarily removed, the bottoms be well broken up and heavily limed, and then receive a coating of several inches of good sandy loam, to be followed by watering. A change to fresh turf is even more desirable.

Some boiled potatoes and a few beans in winter will be found welcome additions to the food, and a patch of greens—especially thousand-heads—will be acceptable at almost any season of the year. But we strongly deprecate the practice of putting whole potatoes—whether raw or boiled—turnips, or even wurzel, into the pens, as nothing except overcrowding is so likely to lead to egg-eating. When the birds take to this practice, they should be supplied with some well-imitated artificial eggs, either of wood or ground glass. The partially pecked eggs should also be filled up with mustard, soft-soap, or some other mixture containing large proportions of cayenne pepper. After tasting of these, the culprits sometimes pirouette, shake their heads energetically, and then settle down both sadder and wiser birds. Avoid overcrowding in the pens, as nothing is more conducive to egg-pecking and bird-pecking. The eggs should also be regularly collected twice a day.

As to the number of eggs to be obtained from pen birds, much will depend upon the season, the supply of food, the healthiness of the birds themselves, and the general management. If liberally fed, thirty eggs each is no unusual number. An instance in which this has been exceeded during the present season has just come to notice. But in this case, care has been taken to give a substitute for the worms, slugs, and other animal food obtained by the birds in a state of nature. Crissel has been liberally used, and greaves have been sometimes resorted to.

The pen birds should never be kept in confinement after the second year, as the hens become weakened and exhausted by heavy laying, in spite of liberal feeding.

4. *Sitting and hatching.*—By careful management, twice and sometimes even three times the number of eggs may be obtained from a penned bird as from the same in a wild state. The many ills that young pheasants are heir to—wet ditches, cramp, and enemies of all kinds—are reduced to a minimum when the eggs are hatched out under a common hen.

The period of incubation is generally about twenty-four days, but some hens sit much closer and hatch off quicker than others. The young birds may safely be left unmolested for eighteen or twenty hours after hatching. Constant attention will then be required. Hand-rearing thus becomes “an art which does mend nature.” It is a necessity arising partly from recent improvements in agricultural procedure, levelling or narrowing hedgerows, grubbing shaws and spinneys, and partly from the delight in “hot corners” which has lately become a ruling passion with game preservers.

The best hens for sitting are probably the game, these generally sitting more closely and making plucky foster-mothers. Too large

a hen is apt to break the eggs and crush the young birds after hatching.

A nest upon the ground, covered with a well-ventilated coop not less than 15 inches square, is to be preferred. Near the sitting boxes should be some dry dust or ashes in which the hens may clean themselves in the intervals of their leaving the nests. Give the eggs plenty of fresh air and an occasional sprinkling with water. A hen may safely be off forty minutes, but not longer.

As it is customary to pick up all available eggs from the wild birds, considerable attention will be required in the hatching off of these to prevent irregularity and consequent losses.

A great mistake is made by putting too many eggs under one hen. In the first place, large hens should never be chosen for sitting upon pheasants' eggs, as their weight is apt to crush them. And with from 18 to 21 eggs to straddle, the outside chicks have little chance at the time of hatching out. From 13 to 15 are safe numbers which should never be exceeded. It may sound well at the end of the hatching season to say that the hens have averaged from 12 to 14 young birds each. And dead pheasants, like dead men, tell no tales. But could the ghosts of all the lost ones rise up and chirp in chorus, the tables would be turned upon the rearer with a vengeance.

5. *Feeding and Rearing.*—The nutriment which the young pheasant draws from the egg is said to be sufficient to maintain it in health and vigour for twenty-four hours after hatching, though we still meet with some strenuous advocates of the traditional peppercorn system. The first food may be ants' eggs if these can be obtained in abundance. Next to these in importance may be reckoned a custard of scalded milk and fresh eggs beaten up, in the proportion of half-a-pint of the former to from nine to twelve of the latter. A good consistency may be obtained by using half-a-gallon of milk with six dozen eggs and properly setting the mixture over a slow fire. To this may be added small portions of hard-boiled eggs, either chopped very fine or grated. Before the end of a week a small quantity of Spanish meal may be used, and after that time an admixture of caycar. Mixed meal, including a proportion of best Scotch oatmeal, may gradually be introduced. At the end of three weeks some finely kibbled maize may be given, and by the time the birds are five weeks old, the strongest of them will commence picking the smallest round maize. Canary seed is very strongly recommended for bone-making. A small portion of biscuit, grits and rice, millet and hempseed, may also be used. But the custard of new milk and eggs supplies every essential to the growth of the young bird,—viz., sugar, caseine, phosphorus, phosphate of lime, sulphur, and albumen. Where meat is given, boiled rabbit, literally done to rags, is to be recommended as being the least relaxing.

Curds are frequently used, but when these are produced by alum, they are apt to prove too astringent. For green food, finely chopped lettuce will be found more valuable than almost any other kind. When meal is added to boiled milk, the mixture should be of the consistency of dough. A small portion of pepper will be useful in cold, wet weather.

Young birds having wet or moist food will require but little water except in the very driest weather. When water is given, a little sulphate of iron may be put into it occasionally, and unless it be very pure it is better boiled first. But early in the morning the young birds may be seen pecking at the dew-drops upon the grass, and a little water from the watering-pot sprinkled near the coop will generally suffice for their wants. In wet weather the chicks should be kept in, and well fed two or three times of a morning, before being allowed to roam about.

A very successful hand-rearer with whom I am acquainted keeps to custard for three days, giving additions of oatmeal and finely-chopped lettuce for four days more, and afterwards some kibbled wheat, finely-ground maize, and split groats for another fortnight; next, well-minced meat of a light kind, such as well-boiled sheep's head and pluck, and after the end of five weeks almost any well-kibbled grain, maize, wheat, and barley.

When the young birds are removed to the springs or the woodrides, with the hens confined in coops, all must be liberally fed. As they advance, the loose corn may be scattered along the feeding tracks, and small stacks of mixed grain may be built up in convenient places for future use. Barley, buckwheat, and beans in the straw may be placed upon stages raised eighteen inches or two feet from the ground, a few sheaves being pulled out and scattered about from time to time, the space beneath affording a good dusting place. By commencing to feed around these stacks very early in the morning, and again from 3 to 4 p.m., the pilfering habits of other birds may be defeated. Even now a variety of food is desirable—an occasional feed of peas, buckwheat, damaged raisins, and even pulped carrots and artichokes help to keep the birds at home. Buckwheat sown towards the end of May or first week in June upon the soil from which trees have been grubbed, or worked into any bare places in the woodlands, will often supply food to the pheasants at the beginning of the shooting season. Shallow catchpools of water should be formed in abundance where there are no streams. As the acorns begin to fall, and after the stubbles are cleared, the birds will wander in spite of all precautions; and the greatest vigilance on the part of the keepers will be necessary in order to have them well together when the shooting commences.

6. *Diseases of Pheasants*.—These are numerous, and the successful rearer will require to be constantly on his guard to prevent disease or to eradicate it when it does appear. A regular change or purification of pens for the breeding birds, dry coops for the sitting hens, pure water for the young birds, and a good supply of wholesome food throughout the season, will generally ensure healthy birds.

Gapes are caused by a small worm in the windpipe. This schlerostoma may be removed by a simple surgical operation, the performance of which bespeaks some skill in the operator, or a little spirits of turpentine may be taken up on the end of a small feather and introduced to the top of the windpipe. This destroys the worm, which the birds afterwards cough up. Another remedy is found in the fumes of carbolic acid, which the young bird may be made to inhale for a few seconds. Savory's machine for this purpose, with a supply of the carbolic acid, may be obtained for about 12s.

Catarrh, arising from cold, may be avoided if not cured by proper shelter and stimulating food. Some people give bread soaked in ale, or dipped in port wine and afterwards squeezed nearly dry. A little pepper in the food is useful, or it may be damped with water containing sulphate of iron in the proportion of $\frac{1}{4}$ oz. to a quart of water.

Roup should be stamped out directly it makes its appearance, as there is no known cure. Remove and at once destroy the infected birds. The copious discharge from the nostrils is a sign of this disease.

Inflammation either of the proventriculus or of the stomach and intestines, is frequently caused by overfeeding, either with animal food or with acorns. Apoplexy is also supposed to be induced by overfeeding.

Lung and Liver diseases in pheasants may be attributed to damp and unwholesome pens, bad or insufficient food, overcrowding, or interbreeding for too long a time. The proper remedies are therefore obvious.

Lead Poisoning is no unusual occurrence at the end of a season when the covers have been heavily shot through at its commencement. The shot is picked up by the birds, ground down by the gizzard and mixed with the food, afterwards causing partial paralysis of the legs.

Disease of the ovary is now known to produce that change in pheasants which is indicated by the hen bird assuming the male plumage. These birds, called mules, are always barren, and as they are invariably mischievous to the young of others, they should be destroyed.

7. *Cost of Rearing*.—This has been variously estimated, and after all it must depend greatly upon the season. In very few cases, where great pains are taken to provide all the requisites for successful breeding,—good shelter, liberal feeding, constant attention and watching,—will the birds fall to the gun at a less cost than about 8s. per head; and where the shooting is rented the cost of this must be added. An

instance came under my notice in 1880, where every pheasant killed cost 12s. 6d. This was after a most successful season. Where game is reared on a large scale, the payment by results seems a fair arrangement for both the owner and the head gamekeeper. In one case of this kind the keeper is allowed 10s. 6d. per bird, after bearing all expenses. Fabulous prices per head have been named, and in one well authenticated case each bird killed had cost considerably above 30s.

Some approximate idea of their cost may be formed from the following figures. One hundred birds in pens may be kept on about $2\frac{1}{2}$ gallons of maize per day; and quite one-quarter more must be allowed for wild birds which get so much assistance. Upon a beat where more than 2,000 birds were killed last year, upwards of a quarter of maize was fed out daily, exclusive of the supply to the foster-mothers. And in practice it has been found that the cost of maize alone throughout the season is sometimes as little as one-fourth, and seldom exceeds one-third of the total cost incurred in bringing birds to the gun.

8. *Pheasant Shooting.* — Fulminations innumerable have of late years been launched at the heads of those gentlemen who indulge in battues, though the reasons for this are difficult to account for. After all, the practice of hand-rearing, keeping birds well within the coverts, feeding liberally, and shooting them rapidly, is one which mainly concerns their owner. By the uninitiated it is supposed to afford but little better sport than a slaughter of barn-door fowls. But whoever has taken part in it and has obtained a good position at the "bouquet," knows that a cool head, a quick eye, and a steady hand are all required to account for a fair share of the bag. It is by no means the contemptible thing that enthusiastic admirers of wild shooting represent it to be. As the long-tails rise in a cloud, to burst and disperse like a whisp of snipe, there is little time to choose, so that a prompt decision is necessary; and the trepidation caused by "Mr. Briggs's first pheasant," which made him feel as if "an ornithological Catherine-wheel had combusted under his nose," has been experienced by many a young hand placed in the fore-front of the hottest shooting.

The pheasant is very strong on the wing, and when he rises quickly is by no means the easy shot onlookers might imagine. Did he continue to "mount exulting on triumphant wings," as Pope describes him, he might soon be disposed of. Or could the sportsman always act upon the advice of an older poet,—

"Should pheasant rise, be most particular,
He rises nearly perpendicular :
Wait a few seconds, till your sight
Perceives his horizontal flight ;"

he might easily account for his bird. But before that "horizontal

flight" is perceived and taken advantage of, your game is on the safe side of an intervening tree, and completely gone from your gaze, like the cunning as well as beautiful bird that he is.

For those to whom "mild October brings the pheasant," to be sought out, put up, and shot at in the old rough wild shooting manner, there is a real pleasure in the sport. Formerly the sportsman to be successful was obliged to know something of the habits as well as habitats of the bird he went in search of; now, most of this knowledge is conveniently relegated to the head gamekeeper.

The dogs most useful in pheasant shooting are undoubtedly either spaniels or setters; pointers are too tender to work among the rough brambles. When found by a setter, it is no uncommon thing for a pheasant to rise into a tree and challenge. For two or three guns, a couple of spaniels or a good setter, after a wet night, *Phasianus* will afford good sport along the wide hedgerows or in the smaller coverts near the stubbles. Later in the day he makes his way to the unpulled mangolds, carrots, or turnips; and if these crops adjoin the woods considerable care will be necessary in order to prevent his creeping away quietly and unobserved. Commence beating near the cover's side, and the dogs should always be taught to hunt pheasants against the wind; for when this is high and the bird rises clear above all obstacles, he will make a long flight down wind, alighting in some low shelter only a few feet from the ground, where he is not easily found either by man or dog.

As birds go out early in the morning to feed upon stubbles, a good sprinkling may be found along the hedgerows early in the day.

In drizzling weather, or when it is very hazy or foggy, birds should be disturbed as little as possible, for they soon lose themselves and fly so far away that they never return. In beating thick hedgerows leading off from the woodside, it is best to commence near the cover and follow outwards, otherwise the birds will steal in. Cool, shady places, such as the dense shade of young alders near water, are very likely to hold them on a warm afternoon. The reclamation of wastes has done much to interfere with the breeding and the enjoyment of wild shooting. But one of its great advantages is, that it may commence at any time after the season comes in, while battues are adapted only to large covers and to that season of the year when the leaves are all off the trees.

A winged pheasant hard pressed will sometimes take to the water, swimming high and freely. The fact that a cock pheasant crows first and claps his wings afterwards, is not generally known. The Chinese pheasant, which has been freely introduced to our preserves, is very hardy, lays an abundance of eggs, produces them early, and is quicker on the wing than the common pheasant.

A. J. BURROWS.

AMERICAN BIRD CHERRY (Prunus Serotina).

THIS tree is coming more and more into popular favour with planters; its timber is valuable for fuel and for cabinet-making and manufacturing purposes. The growth is as rapid as *Acer rubrum*, and a much better tree. When planted close (4 by 4 ft.) it makes a strong upright growth, with a straight body. Thinning, so as to leave 1,200 trees to the acre, makes a fine plantation. Trees at the age of twenty years from the seed, have measured 20 in. in diameter. For posts and railway sleepers, if it is peeled and allowed to season, it is found to be as durable as any native timber. It produces an abundance of fruit, and with culture it is much improved in size and quality. Planted along the highways, it makes a fine shade tree, and perhaps will save many inroads of birds upon finer sorts of fruits. Such strong fruit and flower-bearing trees are becoming popular for road-side planting; beautiful in their bloom in the spring, as well as when loaded with fruit in the summer. Like all stone-fruit and nut-bearing trees, it is found best to plant them where they are to remain, as much is lost in growth by disturbing the tap root.

The White Ash, *Fraxinus Americana*, and the red ash, *Fraxinus pubescens*, are both natives of this region, and valuable trees, flourishing on the high prairies, where they are extensively planted. The wood is close-grained, tough, and much used for making waggons, agricultural implements, and many other purposes where strength and durability are desired. In connection with walnut, it is much used for inside finishing. Both in its native and cultivated state, it furnishes a great amount of seed, which produce plants 1 to 2 ft. in height the first year.

The Black Walnut, *Juglans nigra*, is abundant along the streams, where are most of our native groves. The nuts are plenty, and will, at the time of gathering, sell for fifty cents per bushel. Planted in the fall, the frosts of winter open the hard shell, and the growth is very sure. Having a long tap root, it finds in our porous subsoil a continued source of moisture during the driest seasons. This tree is largely used to fill the spaces where the soft woods have been thinned out. Cuttings of Lombardy planted with them will be of service to induce an upright growth. The supply of this valuable timber is decreasing rapidly, there being a great demand for its export to Europe.

The Honey Locust, *Gleditschia triacanthos*, so much cultivated in Southern Europe, is a native here along the streams and low grounds. The thorny variety makes excellent hedges at the age of four years, and the thornless is generally used in plantations. The wood is very close-

grained, weighing over 50 lbs. to the square foot, and makes very durable posts and railway sleepers, and is being much used for fine foresting timber. The richness of our soil is apt to cause a too rapid growth, hence too much sap-wood and less durability. Close planting, so that the whole ground is filled with roots, causes slower growth and better timber.

Black Locust, *Robinia pseudo-acacia*, was one of the first trees planted in the West, and flourished remarkably till it was attacked by the borer. Thus forests of bored trunks were left which made fence posts that lasted twenty years, and excellent fuel. New sprouts came up, and the growth was soon reproduced, and will continue to do so. The days of the borer seem to have passed, and more planting of black locust is going on.

Of the Maples native here, *Acer negundo* and *A. dasycarpum* are most popular on account of their rapid growth. An excellent variety of the former is a native of Utah, and is a more erect and promising tree. The White or soft Maple, *A. dasycarpum*, flourishes in any soil, and at an early age reaches a size suitable for manufacturing furniture, and for fuel.

The *Catalpa speciosa* is a western tree which proves very hardy and durable. The variety *bignonioides* of the Eastern States will not endure our winters. The railroads are planting the *Catalpa* largely for a supply of sleepers. In an adjoining State a railroad has 500 acres planted. Sleepers now in use for fifteen years are perfectly sound. The beautiful bloom and large foliage makes it a very desirable tree for street planting.

Of oaks we have five native kinds, hickories four, and elms three. The *Ulmus Americana* is one of our grandest trees, and the *Celtis occidentalis*, which belongs to the elm family, is coming into popular favour.

To show the interest manifested in this State, I give the following figures from the statistics of the work done during the year 1880 :—

Number of Forest trees planted, 53,092,046.			
„	Fruit trees	„	2,445,288.
„	Grape vines	„	464,000.

American apples seem to have found a good market in Europe, which will pay our producers if they will only take pains to ship the best. Reports show that 580,000 barrels of apples were shipped to Great Britain up to November 1, during the past year. Much of our dried fruit goes to Germany and Australia. The consumption of fruit at home is increasing at a wonderful rate. One city alone in the heart of the United States, Chicago, last year disposed of two million baskets of peaches, twenty million quarts of strawberries, one million baskets of apples, and other fruit in proportion. In this

State we have a sure market for all our surplus fruit, large and small, in the mining regions of the rocky mountains where it will be impossible to raise fruit to any extent on account of the climate.

Omaha, Nebraska, U.S.A.

J. T. ALLAN.

SURFACE DRAINING.

THE Rev. John M. Wilson, Editor of "The Rural Encyclopedia," says: "The mere surface draining of wet arable loams and ordinary clays is always an inefficient and uneconomical operation, failing in a great measure to effect requisite dryness of soil, and occasioning a wasteful expenditure of at once labour, land area, manure, and the richest portions of the soil; yet it is much preferable to a total want of draining, and may be regarded as indispensable to cultivation on all farms which are prevented by minute subdivision, by poverty, or by prejudice, from receiving the advantages of proper underground draining. The performance of it is very simple and very easy; and yet on multitudes of the small farms of Ireland, where it is peculiarly and eminently needed, it is miserably neglected. The ridge and furrow system is, of course, indispensable to it; and care should be used to have the ridges raised to such a slope as will occasion the free riddance of heavy rains, and to have the furrows so regular and open as to offer neither hollow nor obstruction for the partial stoppage of the descending water. In the fields or farms which have considerable declivity of surface, the furrows, and of course the ridges, should be formed not directly down the declivity, else they will carry off large portions of the most fertile ingredients of the soil, to be deposited in the ditches and swept away toward the sea—but obliquely across the declivity, at such an angle or with such a slope as merely to afford a free descent for water, but without permitting it to acquire any considerable velocity in the escape. An old practice of the farmers of clay districts in England—a practice which all the enlightenment and mighty agricultural progress of the nineteenth century have not altogether extinguished—was to dispose the ridge and furrow upon a slope in a gently winding manner, so as to prevent descending water from having a rapid flow, or from acquiring excessive power of washing away soil and manure. An important rule on all ridge and furrow fields, especially when no underground drainage exists, is to maintain the furrows at a proper and regular depth and perfectly free from all obstructions." "I have often," says Mr. George Stephens, "seen large tracts of clayey land, intermixed with whitish stones, lying in subsoils perfectly impervious, effectually drained by

means of trench ploughing, and keeping the furrows regularly deep from one end of the ridge to the other."

A somewhat peculiar method of surface-draining, consisting of open ditches, gaw-cuts, or cross-furrows, and pows, large main drains, or receiving canals, has long been practised in the Carse of Gowrie, and is still regarded by the less enterprising class of agriculturists as quite sufficient for the purposes of that rich wheat-bearing district of unctuous clay. Yet it occasions a considerable annual expenditure of labour; it obviously wears and wastes some of the very best portions of the soil, and it offers not even the pretence of a substitute for any one of the advantages which result from deep sub-soil draining. "This mode of draining," says Mr. Henry Stephens, in his "*Book of the Farm*," "does not profess to interfere with any water that exists under the surface of the ground, farther than what percolates through the ploughed furrow slices, and makes its way into the open furrows of the ridges. For the purpose of facilitating the descent of water into the open furrows the ridges are kept in a bold rounded form; and that the open furrows may be suitable channels for water, they are carefully water-furrowed, that is, cleared out with the plough after the land has been otherwise finished off with a crop. The gaw-cuts, small channels cut with the spade, are carefully made through every natural hollow of the ground, however slight each one may be, and the water-furrows cleared into them at the points of intersection. The gaw-cuts are continued along the lowest head-ridge into the adjacent open ditch. The recipient ditch forms an important component part of this system of draining, by conveying away the collected waters of the field of which it forms the boundary, and for that purpose is made as much as 4 or 5 ft. in depth, with a proportional width. It is immediately connected with a larger open ditch, which discharges the accumulated waters from a number of recipient ditches into the river or lake or other receptacle which is taken advantage of for the purpose. The large ditch is from 6 to 10 ft. in depth, with a proportional width, and when conveying a full body of water in winter, appears like a small canal." This system obviously does nothing more than draw off excess of surface water,—drawing off, at the same time, saline matter, liquified manure, and thoroughly comminuted soil; and it makes no provision whatever for the pulverulence of the land, for its aëration, for the elevation of its temperature, for the increase of chemical action upon its materials, and for the free circulation of moisture and atmospheric gases throughout its interior. The farm labourers of the Carse, too, expend upon this system an enormous amount of spade work in originally making the gaw-cuts, in both

clearing these cuts and otherwise directing the rills of accumulating water after every heavy fall of rain, in annually scouring out all the smaller ditches, and in periodically scouring the larger ditches, and revising the whole ramification of the drains."

With respect to the inclination or slope of drains, there are certain limits which must not be exceeded; the slope must be such as will at least permit the water to be carried off with sufficient rapidity to keep its channel clear, but not so fast as to injure it by acting on the sides or bottom. Mathematically speaking, the water should pass away with any—even the smallest—inclination of channel, and gradually accelerate in velocity. But we know that in fact this tendency to accelerate is speedily destroyed by the friction and other obstructions in the channel, and these increase in proportion to the smallness of the quantity of water, so that great rivers are enabled to move with less declivity than is required for smaller streams. This has not been sufficiently attended to in the operations on the great English fens; for, instead of uniting the upper waters into one capacious river, they have been divided and led away to different outfalls, greatly to the injury of drainage. Large and deep rivers run sufficiently swift with a fall of about 1 ft. per mile, or 1 in 5,000; smaller rivers and brooks, with a fall of 2 ft. per mile, or 1 in 2,500; small brooks hardly keep an open course under 4 ft., or 1 in 1,200; ditches and covered drains require at least 8 ft. per mile, or 1 in 600; furrows of ridges and field drains require much more; the elevation of ridges measuring across, is, according to the soil, sometimes as high as 1 in 10. Where the ground is level, and there is not in the direction of the smaller drains a fall equal to the above, it may be given in the formation of the drain itself by cutting it deep at the outfall, which is preferable to widening merely.

The limit to the increase of the fall depends on the cohesion of the stuff in which the drain is cut. Firm rocky bottoms may be supposed to bear water passing over them at any slope; but, independent of the old adage, that even the drop wears the stone, the gravel and boulders which are likely to be brought down by swift-running streams, are, by their battering and rubbing, equal to the destruction of the hardest rocks. In brooks and rivulets a fall of 1 in 10 over rock, or of 1 in 30 over large stones, or of 1 in 50 over smaller stones, or of 1 in 70 over ordinary pebbles, or of 1 in 100 over small pebbles, has the velocity of a torrent; a fall of 1 in 200 over very small pebbles, or of 1 in 400 over fine gravel, has the velocity of a rapid stream; a fall of 1 in 600 over coarse sand, or of 1 in 1,000 over common sand, or of 1 in 2,000 over muddy sand and clay, has the velocity of a gentle stream; and a fall of 1 in 4,000 over mud, soft clay, and some aquatic

weeds, or of 1 in 6,000 over ooze and many aquatic weeds, has a dull and sluggish motion, the slowest which belongs to flowing water. But in rivers, these velocities over their respective beds are greater than in brooks and rivulets, and in rills and drains they are less—so that a declination of 1 in 4,000 over mud or soft clay in a small drain, or even sometimes in a large one, would practically be a dead level, and would cause perfect stagnation. Straight and even channels also permit the water to flow much swifter than where it has with the same slope to wind round the different sinuosities of the natural bed, to pass over shoals or through narrows. It may be observed that a bottom of fibrous bog will bear a greater velocity than any loose earth or gravel. The intermatting of the fibres prevents them from being torn away. Accordingly, bog drains stand well, even upon great slopes, if they are not cut to the under stratum; but where that is the case, as it is generally found to be gravelly or sandy clay, the bottom speedily gives way with the stream, and the drains choke if open, or blow up if they are covered.

Draining may be defined as the withdrawal of superfluous or injurious water or moisture from land, by means of artificial ruts or conduits. A drain is designed either to draw off water along the surface, being in connection with springs, or through the subsoil; and hence, though exceedingly various in kind, draining is the most powerful and beneficial of all the several processes for reclaiming waste lands, and for improving stiff soils; it is not indeed exceeded by either tillage or manuring in its beneficial influence upon the richest description of arable lands; and it is equal or superior to all other operations whatever, in the great diversity of its modes of action, direct and indirect, in producing and maintaining fertility. Weather can scarcely be said to have a more intimate relation to climate, than proper draining has to efficient agriculture. The principles of draining, therefore, ought to be thoroughly understood; its practices ought never to be conducted in either a random, a blind-fold, or a prejudiced manner; and all discussions of its nature and utility ought to be unencumbered by theory, and have reference solely to science and facts. The worst of the multitudinous systems of draining which have challenged public notice, deserve some examination, and the best have not adaptation to all lands and districts, and are scarcely beyond the reach of criticism for any. I shall do my best, on this great subject, to be at once clear, comprehensive, and impartial; and in order that every reader may be enabled to form his own opinion of the uses of draining, and of the particular modes of it which may seem best adapted to any given varieties of land, I shall commence by giving a somewhat

full view of the principles on which it acts, and of the effects it produces.

A superabundance of water on the surface of bogs, fens, and marshes is so obvious a cause of great and manifold evils as not to require explanation; yet it operates, in many respects, less mischievously than an excess of moisture in cultivated lands. "The water which is retained under the soil, on impervious layers of earth," remarks a writer in the *Quarterly Journal of Agriculture*, "effects incalculable mischief. The grass can contain no nutriment for live stock, as the finer sorts disappear, and their places are usurped by coarse aquatic plants. The stock can never receive a hearty meal of grass or straw from land in such a state; they are always hungry and dissatisfied; and of course remain in low condition; and from early autumn to late in spring the raw hoar-frost meets the face like a wet cloth morning and evening. In winter, the frost incrusts every furrow and plant with ice, not strong enough to bear one's weight, but just weak enough to give way at every step, while the snow lies lurking in crevices behind the sun till late in spring."

The excessive humidity of our climate, particularly throughout all Ireland, and the western parts of Scotland and England, might suggest the probability of draining being as requisite for the corn-fields of our country, as irrigation is for the rice-fields of the tropics. An excess of either moisture or drought is seen by all observers to injure most cultivated crops, and an excess of humidity in one set of climates, corresponding to an excess of aridity in another set, might seem to the most unreflecting mind to be a provision of the all-wise and all-beneficent Creator to provoke man to the exercise of forethought, prudence, and healthful manual labour. Farmers cannot control the clouds of either a dry climate or a wet one, but they can with comparative ease draw off excessive supplies of water or moisture by draining.

It is the nature of the climate, then, that regulates the necessity for draining, and as the humid seasons greatly outnumber the dry ones in this country, we must therefore provide for that necessity.

Had our climate been like that of Italy, no draining would have been necessary, but our rivers, like hers, would have been directed into channels to irrigate our lands, in order to preserve verdure in the height of summer, on which the eye gazes with so much delight amid the plains of Lombardy.

Plants of different species have different constitutions for relishing or disliking moisture, as well as for enduring extremes of heat and cold; and, with very few exceptions, such plants as agree with much

moisture, contain exceedingly little of the elements of nutrition for either man or beast. The draining of morasses, therefore, brings them into a condition for producing land plants, and the draining of wet grass lands disposes them to exchange their coarse herbage for the finer grasses. The hay from it makes easily, and weighs heavy to its bulk. Pasture grass shoots out in every direction, covering the ground with a thick sward, and produces fat and milk of the finest quality.

Soils of humus, clay, or chalk, if not freed from an enormous proportion of water by drainage, will necessarily produce nothing but aquatic plants, and the natural or artificial stagnation of considerable bodies of water frequently occasions not only the loss to cultivation of the extent of surface which the water covers, but a very mischievous excess of moisture in circumjacent cultivated land. The water of ditches which surround fields, also, particularly of such as extend along the highest side of the fields, often finds its way downward into the porous parts of the subsoil, oozes up to some parts of the surface of the fields, and effects, in wet weather, as great and mischievous discharges and plashiness as the out-bursting water of a strong perennial spring.

The drying of land by draining produces a most powerful effect upon the food of cattle, exterminating noxious aquatic plants, improving the quality of the finer grasses, vastly increasing the amount of nourishment, and occasioning an agreeable dryness, and a palatable flavour in both roots and leaves. Grass lands which were formerly wet, poached, and rushy, become thickly carpeted with fine nutritious grasses, maintain a greatly increased number of sheep and cattle, prevent the sheep from being attacked with rot, and occasion the flesh of both sheep and cattle to be greatly improved in points and flavour. "In the southern districts of Scotland, particularly in the counties of Roxburgh, Selkirk, Peebles, and Dumfries," said Sir John Sinclair, in 1817, "most of the principal sheep farms have been very much drained, and the consequence is, that the size, quality, and healthiness of the stock in these districts have been thereby so much improved, as appears almost incredible to those who were acquainted with the former state of sheep-farming in those parts."

The texture of wet land multiplies the labours of tillage, and is vastly improved in its workable capacities by draining. Its texture, even though everywhere consisting of the same materials, is exceedingly and fitfully various in hardness and softness. Some portions of undrained land are spongy with the springing or the percolating of water; some are consolidated by the successive expulsion of moisture, tread of cattle, and drying by evaporation; some are tough with the

matted and elastic roots of cariceæ and semi-aquatic grasses; and some are stubborn and refractory with the firm imbedding of small stones.

The manure swept away by currents of water is the very best on the land—either absolutely liquid manure, holding in solution the largest possible proportions of ammonia—or solid organic manure in the last stages of *eremacausis*, almost ready to assume the *aëriform* condition, and quite ready; in a great degree, to be absorbed and assimilated by the plants; and though the quantity washed away cannot be accurately estimated, it must in all cases be very considerable, and in some so great as nearly to exceed belief. On pasture lands, also, the loss is enormous. Not only are some portions of the manure deposited by the flocks washed away piecemeal by successive heavy rains during the pasturing season, but a large proportion remains to be swept off by the deluging rains of winter. Much of the manure from the summer's depasturing is still on the surface of the land in autumn; and though portions of it continue to sink into the soil till the latter become saturated, yet almost all which remains after the point of saturation is swept away. Now thorough draining in all instances, prevents by far the greater part of this very serious loss to both ploughed lands and grass lands; and whenever the draining, the soil, and the weather, are such as to coax into the drains the whole of the superfluous waters discharged by the atmosphere, every particle of the loss is prevented.

Draining prevents the injurious effects of the stagnation of water. It does not, of course, and cannot, diminish the quantity of water which soils receive from the atmosphere; but besides rapidly drawing off excessive supplies of it, and averting some most mischievous effects which an excess of it produces upon climate, soil and vegetation, it prevents a malign chemical transmutation of its own properties from stagnation. All stagnant water, no matter how limpid, possesses more or less of the disgusting insipidity which indicates the absence of carbonic acid, and very many specimens of it possess a foulness of both taste and colour which indicates unwholesomeness of condition. If draining, therefore, did no more than prevent the stagnation of water around the roots of plants—did it merely maintain such a current or circulation of water as should keep it in a fresh condition—it would exert a great and benign influence upon vegetation. All this is true respecting stagnation in its mildest forms or initial stages; and as to stagnation in fens, morasses, and vegetating ponds and ditches, the draining of it amounts to the averting of fevers and pestilences from man and all the domestic animals, and of death and extermination from almost all kinds of vegetables except the lowest species of aquatic cryptogams.

Evaporation is the only means by which the stagnating and the saturating waters of undrained land can escape; and at whatever temperature this takes place, whether high or low, it consumes in the susception of every pound of water as great a quantity of heat as can be evolved from the combustion of nearly $2\frac{1}{2}$ ounces of coals. Suppose the aggregate fall of rain on an acre of land to amount in a year to the depth of 30 in., and suppose only the one-half of it to be dispersed from that acre by evaporation, the total quantity evaporated throughout the year would be 54,450 cubic ft. or 1,519 tons, and this would amount on the average to 4.16 tons per day, and would absorb and carry off a quantity of heat, equal to all which could be obtained from the daily combustion of about 12 cwt. of coals. Now all this enormous quantity of heat is either actually extracted from the soil on which the evaporating water lies, or is intercepted from the sun's rays, and prevented from entering the soil by the process of evaporation; so that the whole of it is truly and absolutely lost for the purposes of vegetation. Water has been abundantly proved to be one of the most powerful radiators of heat, or one of the most rapidly cooling substances with which we are acquainted; and during frost, steaming water will acquire a coat of ice sooner than water cold from the well, and boiling water thrown on the ground will freeze sooner than cold water. A wet surface, therefore, is altogether incapable of enjoying, for any considerable time, a genial heat in even the finest and warmest weather; nor, in addition to the enormous amount which it wastes in evaporation, it possesses but for a brief period the richest acquisitions of it from sunshine till they become dissipated and lost by radiation. Nor is this all. Stagnant water is one of the very worst conductors of heat, and, in consequence, seriously obstructs the absorption of heat from the sun's rays by the subjacent soil; and it also acquires a very considerable increase of weight from the loss of heat by evaporation and radiation, and, in consequence, maintains with itself a constant series of displacements of its warmer atoms from above.

On dry and porous land, whether naturally dry or dried by draining, the temperature of the soil cools down to the point of obtaining protection from snow, and perennial rooted plants enjoy a long and a fast sleep throughout the winter, and then they start up in spring with the energy of renovated strength and reinvigorated being.

Draining acts beneficially on the roots of plants, increasing their range for feeding, aiding the healthiness of their absorption, and preventing injury from their excrementation. The roots of plants, by a most beautiful provision of the Creator, grow only by increment at the ends; and when stiff soils are rendered porous and dry by

draining, the roots are coaxed out in all directions, both horizontal and perpendicular—the rapid formation of spongioles or feeding orifices is induced—both the bulk and the ramifications of the entire root are greatly increased—and, when the plants die, the roots remain and decay in the soil, adding to its depth, and resolving themselves into accumulated humus for feeding their successors. “Now,” says Dr. Madden, “when there is an excess of water in soil, all the soluble matter must be continually descending on account of the greater specific gravity of the solution; and consequently, the prevailing direction of the roots of the plants growing in marshy ground should be perpendicular, as this is the direction in which the greatest supply of food will be obtained. Now, I rather think that observation will prove the correctness of this remark; at least I know well that many marsh plants have a horizontal underground stem or rhizoma from which the rootlets proceed directly downwards. If, however, the roots of plants descend, it follows that the excretion of to-day will be relatively nearer the surface than the spongioles of to-morrow; and consequently, if an excess of water be present, all excretions of plants being at first soluble in water, it will follow that the excrementitious matter will become immediately mingled with the food, and applied directly to the spongiole. If this observation be correct, it should be found that marshy plants are not so easily injured by the absorption of excrementitious matters as those growing in drier situations, which may be probably accounted for by the greater quantity of fluid at all times circulating through them.”

The chemical effects of draining upon the saline ingredients of soil may be illustrated by two select instances. Carbonate of lime and muriate of soda, which exist in very many kinds of soil, do not act upon each other under excess of moisture, but mutually interchange their elements under slight or moderate moisture, so as to produce muriate of lime and carbonate of soda. Both of the latter salts are valuable to soil, the muriate of lime by increasing the soil's capacity of absorption, and the carbonate of lime by increasing the solubility of its organic constituents. In most cases, in consequence of the soil being comparatively dry when the phenomenon occurs, the carbonate of soda, immediately on being formed, escapes from further chemical action by effervescence; but both it and the muriate of lime are soluble in water, and when, in any circumstances, they afterwards meet each other in solution, they re-interchange their elements, and resolve themselves into the original form of carbonate of lime and muriate of soda. The sulphate of lime or gypsum exists in most fertile soils, and the gaseous and very valuable carbonate of ammonia is constantly eliminated from the conjoint decomposition

of vegetable and animal matters in the soil; and when these two substances are within range of each other in moderately moist soil, they interchange elements and form sulphate of ammonia and carbonate of lime.

Draining promotes the healthiness and the vigorous growth of plants by lessening the humidity of the lower regions of the atmosphere. The coldness of wet lands condenses the aqueous contents of the immediately incumbent atmosphere into vapours so thick as sometimes to be visible, and the dissipation of their excess of water chiefly by evaporation, produces almost constant accumulations of uniform humidity over their surface; so that, from these two causes, wet lands are overhung by an enormously larger amount of humidity than lands which are dry. Now this excess of humidity dwarfs and deteriorates land plants at once by lessening their absorption of carbonic acid, by decreasing their evaporation of the useless portions of their sap, and by diminishing the number of their stomata or organs of communication with the atmosphere. Draining has a powerful effect on the salubrity of climate; and though this consideration does not directly affect the soil, it exerts so mighty a power as to convert regions of red-hot pestilence to both man and beast into regions of eminent healthfulness, and of almost total freedom from epizootics and epidemics. Nor does it produce its salubrious effects merely upon a great scale when practised throughout a kingdom or an extensive region, but also upon a small scale, when practised in a parish or throughout any particular swamp. The prime object of all ordinary draining, as well as its prime result, is increase in the value of crops. But even in the multitudinous cases of ordinarily good draining, the increased value of crops is very variously estimated, and seems to be very various in reality; and probably it is in a great degree controlled both by the intrinsic properties of the land and by the particular methods of draining.

The simpler methods of draining, or those of withdrawing water along the surface, appear to have been practised from very ancient periods of agricultural record. Cato, Palladius, Columella, and Pliny all mention draining, and show themselves to have been acquainted with some of its most advantageous effects, and with various methods of constructing both open and covered drains; and Pliny, in particular, describes some methods of draining practised in his day, which were not long ago regarded by some of our non-classical agriculturists as modern improvements.

In 1764, while the system of subsoil-draining continued to be very limitedly known, and while very shallow and inefficient systems were generally prevalent, Mr. Joseph Elkington, a farmer in Warwick-

shire, accidentally discovered the system of strata-draining, and became the originator of a great and very general reform in the draining practices of Britain. He was plagued with a degree of land-wetness, which rotted many of his sheep, and while he was digging a deep trench, to serve some purpose of draining, he forced a crowbar four feet through the bottom of the trench, with the view of ascertaining the nature of the strata, and, on pulling it out, was surprised to find it followed by a copious and permanent flow of water. He made an inference as to subterranean currents of water, or the general nature of springs, and arrived at the doctrine that the draining of sub-soils or sub-strata may be readily and thoroughly effected by tapping with an auger or a rod. His doctrine was worked into a system, put to the test of experiment, and rapidly promulgated among wondering and grateful agriculturists.

Most of the ground devoted to planting is too wet for that purpose, without thorough drainage, and must therefore be rendered perfectly dry before planting can be done successfully. We can no more rear healthy trees than we can grow vigorous crops on a swamp, yet if this is well known, it is certainly not generally acted upon. We have only to look at any plantation to discover the loss sustained by this generation from the neglect of drainage on the part of our progenitors. Healthy, full-sized timber is never to be seen on wet ground; and yet we go on, even at this day, planting in such soil, utterly regardless of drainage, or, at all events, considering it a matter of doubtful importance, and acting accordingly. How often do we find a plantation, in which almost the only vigorous trees are those along the turf-fence that was cast up for its enclosure, from its affording a dry bed, in which the roots of the trees find subsistence. In these cases we have a proof of what the plantation might be if it had been drained, while we find that the whole interior is, perhaps after from thirty to sixty years' growth, scarcely fit for paling rails. With these beacons before us in all parts of the country, one would think it scarcely possible that similar land would continue to be planted without proper drainage, but such is the fact. Above all, then, previous to planting, let us see that the land is either naturally dry, or made so by draining.

The chief remunerative means, if not indeed the only one, of improving hill pastures, is draining. Until lately, a man who would propose to drain hill-grounds would be almost deemed insane; but there is a great change taking place gradually, though slowly, in this respect. Many hill-farms have been surface-drained, and thereby improved to an almost incredible extent, but the example is, as yet, very tardily and hesitatingly followed. Doubtless the day will come

when an instance of an undrained hill-farm will be as rare a spectacle as a drained one is now. The expense of draining is on some soils much sooner repaid than on others. It will not pay, for instance, to drain moss-land, as the grasses natural to such soil when in a moist state, give way after draining to absolute sterility. It is found that where there is naturally a luxuriant herbage, draining is most remunerative. The coarse, innutritious grasses are replaced by tender, succulent herbage, which always attracts and nourishes the stock.

Underground deep tile drainage is, of all other systems, decidedly the best for thoroughly drying the ground, but is less adapted to arboriculture than to agriculture, not that trees enjoy the benefits of draining less than corn or turnips do, or are in any way less appreciative than cereal or green crops are, but the principal objections to underground drainage for forest trees are first, the comparatively large expense of the work, being about three times greater per acre than that for open surface drains; second, the unsurmountable difficulty in preventing the roots of the trees from penetrating the ground to the depth of the tiles, and choking them. From the circumstance of the ground having been rendered loose, free, and open in the process of cutting the drains, it, on that account, becomes more attractive to the roots of the trees than hitherto, and in obedience to the laws of nature they follow such congenial soil till they reach the tile and choke the drain. Many plans have been adopted to remedy this, but all of them have hitherto proved more ingenious than advantageous, and none yet known has proved successful; the depth of the drain, size of the tile, and attractiveness of the soil and subsoil, each severally or conjointly determine the length of time the roots will take to reach the tiles, but under the most favoured circumstances they will ultimately reach them, and render them practically useless for the conveyance of water. A modification of the tile drain has also been tried, and not without some success; it is constructed in the following manner:—the drain is first cut to the usual depth, say $3\frac{1}{2}$ to 4 ft. deep, and laid with 3 or 4 in. tiles in the ordinary way, the drain is then partially filled in with the earth excavated to about two-thirds its original depth, and is sloped on the sides as an ordinary open surface drain. The surplus earth is spread backwards on both sides, and the drain is thus complete. The advantages of this system over that of ordinary deep tile draining are, that the roots are longer in reaching the tiles on account of the sloping bank which they must traverse before they reach them, combined with the circumstance that they have to pass through an unfavourable soil. The drain continues to act as an open surface drain and deep furrow drain conjointly, which is no small advantage during excessive floods and melting

snow, and when at last the roots penetrate the tile, and cause the water to rise to the surface, nothing serious takes place by such an occurrence, and all that is required to be done is either to lift and relay the tiles or to keep the open drain clear to the depth to which it was originally filled in. This can at all times be done without either widening or deepening the drain, which is not only expensive but attended with very serious results, for, as a matter of fact, no part of the surface of a plantation is so completely interwoven with roots as the margins and bottom of drains, and the circumstance renders it both very difficult and hazardous to be done, for the cutting of so many of the principal roots of the trees causes them to blow down during the first gale, and, as is well known, the blowing down of one tree is often the occasion of several others being likewise blown down, or even a whole plantation. This points out the necessity of doing all the drainage necessary for the proper growth of the plantation at the time of originally forming it, so that as far as possible neither cutting new drains nor deepening old ones may be necessary in after years.

The distance apart at which drains should be put must be regulated by so many circumstances that no fixed rule can be given for it, neither can it be determined by any abstract rule what depth the drains should be cut.

During many years of extensive draining operations, I have drained at all distances from 10 to 30 ft. apart, and from $1\frac{1}{2}$ to 5 ft. deep. One rule ought, however, to be observed, viz., to drain so that no water remains in the soil within one foot of its surface, and to accomplish this the drains frequently require either to be put very close together or the cut made very deep, and where choice can be made, I prefer putting surface drains close rather than deep, and deep rather than close with underground drains. Deep drains in a plantation are very objectionable, rendering the value of the plantation at all times much less than it would otherwise be, whether as a subject for grazing sheep or cattle, as covert for game, a place of sport and pleasure, or for cutting and clearing the wood as thinnings, or as a mature crop; indeed, as respects the latter operation, numerous deep drains frequently detract from its value from 20 to 30 per cent. or more, as all wood merchants can testify.

The object sought in open surface drainage for plantations is altogether different from that of furrow tile drainage; the former is only intended to clear the surface of the ground of stagnant water to a depth not necessarily exceeding 12 inches, for the sake of allowing the air to penetrate the soil, raise its temperature, and allow the tree roots to penetrate and spread. Trees, unlike common farm crops,

when fairly established in the ground, perform for themselves a very effective work of drainage, for no sooner does the tree rise to such height as the wind can move and shake it, than it opens and loosens the soil on all sides, thereby inducing the superfluous water to sink to a depth beyond where it can injuriously influence the growth of the tree, and also by another process considered very effective in drying the soil at all seasons of the year, viz., absorption by the roots, and evaporation by the leaves. The best indication as to whether the ground requires drainage or not is probably that of the herbage growing upon it. Any one acquainted with natural grasses knows which are produced under the influence of stagnant water, and which the product of dry soil. Another good test is that of turning up a spadeful of earth in ordinary dry weather; if it is found pasty and close it is too wet for the proper growth of trees, and must therefore be drained in order to secure proper success; one very decided advantage of draining is produced by spreading the excavations on the surface of the ground, and it is often warrantable to put the drains sufficiently close to cover the entire surface with the excavations. The effect of thus spreading the excavations is to encourage in a remarkable degree the roots to run upon the surface of the ground; the earth thus spread also induces the natural herbage to a great extent to decay, and by these means the plants are so far fed and nourished as never at any subsequent stage of growth to lose the benefits thus derived. The upper surface of the ground is frequently covered with a thick matted herbage which greatly injures plants, and immediately below this coating is a layer of soil, dead dough, and unsuitable to the young plants in that inert state, but when grit or sand in the excavations mix with it on being washed in with rains, it produces a degree of growth quite incredible.

C. Y. MICHIE.

(To be continued.)

THE ANCIENT FORESTS OF HANTS.

“THERE has been a time when Britain was well-nigh covered with forests, and was without human inhabitants. The elk, the bison, and the wild horse roamed in droves over the land; the beaver built in the rivers and fens; herds of elephants pastured in the Oxford woods; the bear and the wolf, even the tiger and hyæna, lurked in the caves of Devonshire or infested the Yorkshire wolds; the whale gambolled in the waters of the Forth.”

Such are the opening words of a history which has done much to place before us a vivid and an accurate picture of our country in its oldest times. The description suits on more than one point the southern county which is the subject of the present paper. Its state, at the time of the first Roman invasion, was, with the exception of the downs, one of almost continuous wood. On the thin soil of those wind-swept heights there are no vestiges of former forests. The soft verdure of the Southdown Hills may be in part derived from the flocks which pasture them, and the sheep must have followed horned cattle after a long interval, implying a country at all events partially cleared, and a state of protection and peace. But though the grass may have been coarser which first covered them, it appears to have been their only growth. The ancient Briton, when he became advanced enough to domesticate cattle, may have used such spots for their pasture as well as for his own summer home. But the ordinary hills and the plains and valleys of Hampshire were one great wood; even in the days of the Saxons, the Andred Weald is known to have extended through three counties, with a length of more than 120 miles, and a breadth of 30. The Norman invaders found the country still densely wooded.

In a list of the Ancient Forests of England, given in Mr. Pearson's Historical Maps, the woods of Hampshire appear to outnumber those of any other county. They may be considerably diminished in extent, but most of them exist to this day. Lyss Wood, near Petersfield; Axiholt (the modern Alice Holt), and Wulvemere (Woolmer) perhaps were as truly portions of one and the same great forest as Durley and Wigley, Rumberge and Bremblewood, Knightwood and Ringwood, were but divisions of the New Forest. Beyond Alton came the woods of Odiham, Pamber, near "the Vine," Freemantle, in Kingsclere hundred, and the Fecceswudu and Tadley Wood.

Following to the south-west came Andover Forest and Buckholt adjoining; Wherwell, or Harewood, lay farther south, but at no great distance, towards Winchester.

In the heart of the county were great woods about Avington; further to the south-east lay St. Clare's Wood, near Exton (the Wudu (Ersce probably), and farther to the south still, the Forest of Bere.

Kilmiston, or Hormceres, or the Hormeswudu, is to be added to these, extending towards Bishop's Waltham on the south and northwards to Old Park and Cheriton Wood, the former a deer forest in the early Norman days, and probably long before, with the "deer leap," still talked of on the Common outside the Covert.

The whole south-western peninsula (if the reader will take the

Avon for the western boundary of it), comprising more than 90,000 acres, was forest.

Such was the state of Hants in the Norman days. I am aware that forest, in the language of the time, meant rather a Chace, a place excluded from cultivation (from the Latin "foris," outside), than necessarily a wooded place. In all probability the proportion of woodland in the New Forest to the barren moor, was not larger then than it is now. The greater part of the soil at present is as unsuited for timber as it is for pasture or corn, and for thousands of acres the bare heath has not a vestige of any former trees upon it. There is, however, little danger of exaggeration in saying that the Forests of Hants, as the early Norman sovereigns found them, covered a large proportion of the county; and as the Romans had found them, formed one great and almost impenetrable wood, a natural defence against the Gauls.

It need not be supposed that the intervening period was insufficient for the partial clearing of these forests if they had been so extensive as we have suggested. The Andred Weald itself disappeared in the course of one century in the furnaces of the iron-smelter,* and earlier still, protecting laws and severe penalties showed that the denudation of the country of its wood was felt to be proceeding too rapidly. "If any man burn a log in a wood, he must pay sixteen shillings," say Ine's Laws, "for fire is a thief." No man, by Canute's laws, might cut brushwood without permission in a King's forest, and there was a heavy fine of twenty shillings for the destruction of any tree "that gave food to the beasts."† We have only to look at the improvident haste with which vast woods are cleared away in modern colonies to see how soon the face of a country may be changed in this respect; and how credible the legend is that the great wood of Hampden was felled by the Bishop of Winchester in the three days which were the limit of his leave,—the only tree that was spared being the Gospel Oak, a still surviving witness of the time and of the fact.

It is essential to a just conception of the ancient forests of our land, that we should ascertain what were the trees which composed them. What were the indigenous trees of Britain? It is upon the character of these that our mental picture must depend. Were the forests an impenetrable bush? Or a collection of bare poles with all their foliage at the top, such as may be seen in some of the Colonies or in the United States of America? Or should we have a truer notion of them from that large tract so strangely called the New Forest still, though it is old enough to have a Latin name besides?

* Pearson's Historical Maps.

† Same, page 50.

The known native forest trees of England are singularly few. The oak, the birch, the wych elm, the willow, the alder, the ash, the maple, the aspen and the yew, almost complete the list of timber trees found here by the Romans. The Welsh name of the beech (*fawydd*) may easily be traced to the Latin *fagus*; Cæsar's statement (needlessly discredited) that this tree was not found in Britain is not likely to have rested on the very scanty opportunity he himself had of personal inspection. His words "*præter fagum et abietem*" do not except the Scotch pine, but the silver fir. The lime and the beech were well and widely established here before the Norman period, but may both be set down to Roman introduction. The great Tortworth chestnut, so called in Stephen's reign, may be the oldest of deciduous trees in our land; but this it may be without being indigenous. We have more than one Lyndhurst, so named from the lime, but yet the lime did not exist in the ancient forests. Everything conspires to assign precedence to the oak—the earliest records, the testimony of nomenclature, scientific researches, the nature of the wood. In the vast bogs of Denmark, from which have been lately taken more than a million of trees,* the succession of different kinds of indigenous trees is as distinctly marked as the successive periods of geological strata. Lowermost are found the Scotch fir; next, the oak; nearest to the surface, the beech. Each of these must have had its reign, and apparently an exclusive reign, and each in its turn may claim to have been indigenous. But in singling out the oak as especially the ancient British forest tree, there is also this to be said in justification; perhaps more than any other tree it will inhabit all soils; clay and gravel, sand or peat, chalk or limestone. Of course it has its preference, but any one may notice how the acorns shed from the trees standing in the rich strong soil of an old wood, find their way on to the adjacent heath or moor, and flourish with the invariable vigour of what is *naturally* planted.

We shall probably be right, then, if we are guided by the traditional veneration for the oak which still pervades our land, and consider that the primeval forests of Britain were for the most part composed of this tree. If so, we must not imagine these great woods to have been an *impenetrable jungle*. What has taken place observably in the highland forests of native fir, took place, no doubt, in the oak forests of the south. Nature pruned and thinned as well as planted. The strongest plants among the self-sown oaks would domineer over the rest; the natural process of selection would go on, till all but one were stunted and destroyed within the circle of the champion's branches. What would eventually ensue would be rather a natural

* See "Glances at the Forests of N. Europe," *Journal of Forestry*, vol. II. p. 247.

park than a tangled forest, with glades of light and verdure such as form the character of many parts of the New Forest now, the kings of the wood sweeping for themselves a privileged space around them; suited to their remote antiquity and regal nature. In these deep glades the wild deer could roam and pasture, the native Britons and their shaggy horses find a home; and in later times the outlaws of society live upon the spoils of the chase and the plunder of the infrequent traveller. Where Robin Hood and Little John could spend the less inclement months of the year, the rude native of earlier centuries might make his constant home and yet live out all his days; *neither* of them could have survived a single summer in a forest which admitted neither air nor light.

What game inhabited these wide-spread forests must be in some degree a matter of conjecture. Not to speak of the earliest times, when those creatures roamed the woods whose colossal bones are stored in many caves, now ransacked by the palæontologists of our day, and when man, if he were contemporary, must have rather been the prey than the pursuer, we may draw some fixed conclusions from the few and scattered notices which have come down to us on the subject; and we may assume, from the great virgin forests still existing that there were no woods *then*, any more than *now*, without some living creatures to inhabit them, such as could find sustenance on the seeds and berries of the trees, or on the herbage of the ground around them. The hare must have been found at all periods in the woods of England; its great fecundity (notwithstanding its defenceless nature) has long been known. *Æschylus* calls it *ερικυμονα φερτι*, "extremely prolific." In early Britain, its life was guarded from its greatest enemy by superstition; "*leporem gustare fas non putant*," wrote *Cæsar*. The red and fallow deer were to be found, no doubt, in the woods; wild-fowl would circle above the waters, wherever the hindered rivers spread out into a sedgy lake; the badger and the fox had their earths, already subject to be disturbed by those who even then killed what they refused to eat. Perhaps the catalogue may be more questioned, when to these are added the birds which we are apt to associate in our minds with the civilization and luxury of only modern times; yet is it no less true that the partridge and the pheasant had found a home in this land at least as early as the Saxons, for a charter of the Confessor's enumerates the beasts of the chase as follows:—

"Hart and hind, doe and buck,
Hare and fox, cat and brock;
Wild-fowl with his flock,
Partridge, pheasant, hen and cock."*

* Codex Dipl. 869, p. 4, Pearson's Maps.

To this list of indisputable authority we may, without much misgiving, suggest that the bittern and the heron may be added; the woodcock and the snipe too would be found in this island when its state was more suitable to them than at any time since: and so our conclusion may be drawn that a thousand years ago those who felt the indefinable charm of capturing the wild creatures of the chase, would return from the swamp and from the forest with much the same rewards of their skill and toil as the sportsmen of to-day.

The reader may miss from the list in King Edward's charter the proscribed wolf; but perhaps this may be taken as a sign that the price set upon his head in an earlier reign had exterminated him. We find his name at least in the Forest of Woolmer (Wulvemere); but a single specimen of the kind would have been as great a prodigy when Queen Anne made her royal progress across that forest, and had the five hundred red deer driven into sight, as such a herd now would be to the traveller on his way to Portsmouth.

Many another of the names of the Hampshire woods survives the prevalence of the creature which originated it. Brockenhurst has ceased to be the haunt of the badgers; Hackwood is no longer distinguished for its hawks; Boarhunt is not now infested by the wild boar out of the Forest of Bere. The cry of a bird, all but lost to us, may no more be heard at Bitterne.* But does not the very choice of such names testify to that which has ever been a ruling characteristic of the inhabitants of this land, a passion for the sports of the field? Any alteration in the laws which should lessen this taste or the power of indulging it, must be purchased at the loss of an important trait in the national character, and divest the woods and forests of England of one of the greatest charms they possess.

A. C. BISHOP.

WHAT IS TO BE DONE WITH LAND?

No. 2.

(Continued from page 103.)

LAST month I suggested a plan for fixing a fair rent,—namely, that a certain proportion of the actual produce is to be the rent. That there are objections to this plan is not to be denied, but they are not insuperable, and certainly no time could be more favourable for the consideration of the tenure and cultivation of land than the present, when from one-third to one-fourth of the arable land in England is a blank ready for any experiment. My suggestion

* A bittern (one of a pair probably) was found close to a cottage called Stowchester in Woodmancote Holt in the year 1864, near a rushy pond. The bird drew persons from all quarters to hear its booming.

is nothing new; it is merely a leaf taken out of the book of the past, and it is moreover founded on reason and common sense. Since that article was written, I have noticed that the "North American Land Association," of which Mr. Clare Sewell Read is a director, states in the prospectus, "that tenants are willing to give by way of rent one-third of the crops grown (delivered at the nearest railway station)." Then why not in England, I ask?

I now come to consider the size of the holdings. For many years a certain number of political economists have held that farms have been made too large. The causes of this are not far to seek.

During the Peninsular war, and up to about the year 1855 or 1856 the profits of farming were so great, that landowners were induced to get rid of the smaller holdings by adding to the larger, which were generally speaking farmed by men of capital and intelligence, who were ever ready to adopt the safe teachings of science and commerce. This was the era of scientific farming, and experts were ready to assist in the introduction of artificial manures and foods. Improved machinery, drainage, &c., were soon to make mother-earth double her increase. How far this has been the case need not be dwelt upon; at any rate I may venture to say that more has been spent on the land in a scientific manner than can be justified by the produce, or is ever likely to be. Sir Humphry Davy is credited with the saying that, "the time will come when the farmer will take manure in his saddle-bags sufficient for an acre." The time did come, and I am afraid the time has also come when the farmer might take back the produce in his saddle-bags. I recollect the time when the wooden plough and harrow, the reaping-hook, scythe, flail, and primitive winnowing-machine, were in common use. Now we have the iron plough and drill, the reaping-machine, horse-rake, elevator, and thrashing-machine. Then there were no artificial manures, and no artificial feeding stuff for improved breeds of cattle.

An old-fashioned farmer would say that, "the land required a *bulk* of manure and not the *essence* only," and the truth of this saying is self-evident, but yet I have seen, year after year, the modern farmer applying some stimulating compound as manure to the land. Now, as one who has been "by science led astray," I wish to "hark back" and say that the less we have of agricultural chemistry the better. From these remarks it may be guessed that I am about to advocate a return to the more primitive times of farming, and so I am. Farming is a primitive business, and all attempts to make it otherwise are failures. Let me say, however, that it would not be wise to discard all improvements; but that land will not stand any more new-fangled notions in the shape of machinery, manures, feeding stuffs or improved breeds; for the present their day is past.

In considering how the present large holdings may be reduced, we will take, for example, a 500-acre farm, with house and all necessary farm buildings, and of this will suppose that 50 acres of the wettest and poorest may be planted with trees, selecting for this purpose trees that will grow on wet and on poor land. Let no unnecessary expense be incurred on scientific forestry, for nature has provided trees for all sorts of soils and situations. In the next place, let 250 acres be allotted to the present farm-house and buildings. There will then remain 200 acres of the original 500 to be allotted. Let this be divided into two farms of 75 acres, and five of 10 acres, making in all seven new homesteads. It may be supposed that there are a certain number of cottages on the original farm—say five—which can be made suitable as homesteads for the ten-acre allotments. There will remain two homesteads to be provided for the seventy-five acre holdings. I will assume that, from various circumstances, many landowners are not in a position to lay out the money themselves, or borrow, say from £800 to £1,000, in providing the necessary buildings, and that they must look out for tenants able to do so. Therefore there must be fixity of tenure and an arrangement come to whereby the tenant would be secured against loss, in case of his wishing to leave, or from inability to cultivate the land. It is evident that some such plan must be adopted, if we are to restore the rural population to England. For what does the last Census reveal? In almost every rural parish it shows an alarming decrease of population in the last decade. Whether caused by migration or emigration, still it would appear that the charms of a rural life in England are gone. But is it really so? I say no. Let the condition of things be altered, and many a one would return to the country. If the decade we are now entered on be as the last, where shall we find the healthy, unsophisticated country lad, to replace those worn out by the wear and tear of life in towns? The town has never produced the raw material, the “*thews and sinews*” of the man, equal to the country-bred. Without enlarging on “*a bold peasantry is their country’s pride*,” I may safely say that the rearing and training incidental to rural pursuits best fits men for the ranks of the army.

JNO. SMITH.

(To be continued.)

PRESERVING TIMBER.

IT is satisfactory to know that there was an increase in Great Britain of 222,194 acres under woods and plantations in 1880 over the acreage in 1879. It would appear to indicate that one of the results of agricultural depression has been to increase the extent

of land under woods, because timber is expected to pay equally as well or better than the late unprofitable use of the soil. This increase is reassuring, considering that in many countries the production of wood does not increase, but is absolutely declining, notwithstanding that its consumption increases from year to year, owing to the extension of railways and the development of industrial progress all over the world. A great deal of the timber formerly produced was allowed to rot or decay, because there was no known satisfactory process of preserving it, and oak could only be used for railway sleepers; but now many other kinds of wood can be used for this purpose after they have been artificially hardened and preserved. Under the influence of the oxygen of the air, and its moisture, the nitrogenous substances occurring to a greater or less extent in all kinds of wood decompose, and thereby induce the decomposition of cellulose and other non-nitrogenous bodies. The more nitrogenous matter the timber contains the more liable it is to decay, considering that it also harbours all kinds of fungi that penetrates into the substance of the timber in search of subsistence. For this reason trees should not be felled in spring when they are full of ascending sap containing this nitrogenous matter, but in winter or late autumn. The different methods of preserving timber are merely obvious methods of preventing the decomposition of the nitrogenous matter. Besides impregnating the tissues and vessels of the wood with various antiseptics, timber may also be protected from decay by charring, smoking, or baking.

The initial difficulty in impregnation was that of forcing the antiseptic into the cells, but that has been overcome by performing the operation under considerable pressure. Railway sleepers are usually preserved by impregnation with cupric sulphate, or zinc chloride. There are also various other substances, such as tannin, creosote, mercuric chloride, lime, salt, iron, acetate, pyroligneous acid, &c., which are and have been used for the preservation of vegetable as well as animal substances. Some timber impregnated with salt previous to the Christian era is still in good preservation. However, the use of salt is limited, since the presence of moisture will dissolve it out as well as cause it to crystallize in the interstitial spaces of the wood. I have repeatedly tried the preservative effect of those substances on organic bodies; in fact any one who has the inclination and the arrangements may do so.

HUGH CLEMENTS.



ARBORICULTURAL EXCURSION.

ARBORICULTURISTS will bear in mind that the summer excursion of the Scottish Arboricultural Society takes place this year on the first week in August. The field selected for the excursion is the celebrated district of Moray; renowned from the earliest times to the present day for the extent and beauty of its natural forests, which, combined with its extensive and well-managed plantations, render it one of the most attractive spots in Scotland to the arborist and the practical forester. The town of Forres is the rendezvous for the excursionists. It is situated in the immediate neighbourhood of some of the most celebrated forests in the district. The ancient "Forest of Darnaway," owned by the Earl of Moray, and extending to many thousand acres, is close at hand, as well as the rich sylvan beauties of Brodie and Dalvey; and the no less interesting sands of Culbin, rendered famous among arboriculturists by the success which has attended the planting of them with Scots fir and other trees to arrest the inroads of the drifting sandhills. Within easy reach are the extensive natural pine forests of Upper Morayshire (locally called Brae-Moray) and Strathspey, and the richly-wooded district around Gordon Castle in the eastern part of the county.

In historical and traditional associations the district is extremely rich. Macbeth's famous "blasted heath," where his weird interview with the witches took place, is near Forres, and is now known as Hardmoor, and considerably enlivened with modern plantations. "Randolph's Hall," at Darnaway Castle, will no doubt form a great attraction to the excursionists. It was built by the famous Randolph, Earl of Moray, and Regent of Scotland during the minority of King David II. It is about 90 feet in length and 35 feet in breadth, and the beautifully arched roof of carved oak is one of the finest things of the kind to be seen anywhere. There are numerous other places and objects of the greatest interest, but which we cannot find room to mention. However, with such an attractive feast before them, we expect that arboriculturists will muster in large numbers from all parts of the country to enjoy the pleasant and instructive outing provided for them. Forres has a station on the North of Scotland Railway, and is easily accessible from all parts of the country. It is provided with several first-class hotels, where the excursionists will find every comfort and modern convenience. Those intending to join the excursion, and desiring full information, should apply at once to the Secretary of the Society, Mr. John McLaren, 5, St. Andrew Square, Edinburgh.

THE HOME FARM IN JULY.

HAYMAKING will still be in hand, as much of the grass had a rather late start. Do not allow the seeds to ripen before mowing. Tares and lucerne mown for fodder should be well made before being stacked. Trim haystacks as soon as they are topped up and fairly settled, and thatch at once. When the hay is injured by the weather, mix a little salt with it during the stacking.

Turnips for a main crop will now be put in. Secure a fine seed-bed, and manure liberally. Scatter mixtures of white gas ashes, lime, sulphur, and soot where the young plant is attacked by the beetle. Set out and single mangolds and swedes. Keep the horse-hoe constantly going among potatoes, mangolds, swedes, cabbage, and kale. Sow coleseed and mustard for autumn feeding.

Hops must be kept clean by constant shimming and hoeing; ladder-tying will now be necessary. Use the sulphurator as soon as mould appears; keep the hills well cleaned out, and free from superfluous bine. Hill up the plants towards the end of the month; lay in charcoal, coke, coal, &c., for drying, and otherwise prepare for the "hopping," which may follow close upon harvest.

Harvesting.—Early peas, rye, and winter beans and oats may be ready for cutting by the end of July. Put all such corn into small wads and sheaves, and allow time for thorough harvesting; also prepare straw for the remainder of the corn stacks, to be ready for the pressure of harvest when little time is available.

Live Stock of all kinds will now require to be kept thinner upon the pastures. Give cotton cake with luxuriant grass, especially in wet seasons, and linseed where grass is short. Wean lambs. Draft out and feed aged ewes. Supply cart horses with abundant green food and some corn. Clover, tares, mixed seeds, and the second cut of comfrey will now be available.

Dairy.—Turn cows upon aftermath grass, and let them be well shaded during the day, and abundantly supplied with water in the hottest weather. The dairy should be cool, well ventilated, and its surroundings thoroughly sewered. Use carbonate of soda in cleaning the dairy utensils. Attend well to cows as they calve down, and give them some medicine when in high condition.

Poultry must be forced for early marketing, especially the turkeys and geese for Michaelmas.

Estate Work.—As haymaking and other farm work permits, clear up all woods, lay in materials for repairs and draining, and cart together composts for the garden and for woodlands. Also attend to wood and wire fences, straining up, repairing, and painting where necessary.

A. J. B.



ENGLAND.

A NOTHER indifferent bark-stripping season has been followed by a fine harvesting time, and though we had reached the second week in June before the work was completed and the bark delivered, the condition and quality were everything we could desire. Again about £4 10s. per ton, delivered to rail, has been somewhat reluctantly given by the merchants and tanners, even though the fall is short.

The clearance of the falls should have been already effected as the season has been favourable to cartage. By the 1st of June all under-wood produce was cleared, and the oak timber, bark, and top soon followed.

Much mischief was done by the long and severe frost, and even now some of the evergreens have not recovered their wonted freshness. Wind-waved transplants have been difficult to refix owing to the hardness of the ground. Pruning has commenced in some places; but up to the present time systematic thinning and pruning have not found that favour in the eyes of foresters upon small estates to which their merits entitle them.

With much heavy land on the hands of the owners, and more vacant farms looming in the distance, unless seasons alter very considerably, steam cultivation for planting up poor clays and thin arable lands should everywhere be resorted to. Every encouragement to lay down to permanent pasture should also be given to the tenants of such lands.

Trim ornamental hedges of laurel and yew, using the pruning knife with judgment. Also, plant out hollies both for growing into ornamental bushes, and for hedges. Strong plants may now be removed with a greater chance of success than at any other season of the year.

Young plantations will require attention to fix trees, keep down rank undergrowths, repair fences, select the subjects for the next winter's thinnings, and destroy injurious insects wherever possible.

Budding may now be carried out upon hawthorns and horse-

chestnuts. Keep the stocks free from scions which divert the sap from the head.

The nursery will afford plenty of work in pruning up strong plants, hoeing and clearing away weeds, watering when necessary, and thinning beds of young plants. Carry all refuse vegetable matter to the compost heap, and thoroughly mix it with soil, adding lime, limeshells, or chalk, later on.

Pluckley, Kent.

A. J. BURROWS.

SCOTLAND.

VEGETATION made great progress in the early part of last month, but suffered a severe check in the second week of the month, and particularly so during the night of the 10th, when a sharp frost—for the season—was experienced, which resulted in considerable damage being done to the leaves and tender shoots of many trees.

The season has been all that could be desired for the harvesting of bark. The peeling should generally be completed before the end of June: and all bark yet outstanding should be stored as soon as possible. We hope to be able to maintain last year's price, but little (if any) increase in the same is looked for. The timber should speedily be cleared off the ground. Have the same neatly dressed and lotted for Public Sale on roads convenient for removal, or otherwise disposed of.

Prune forest trees and hedges of all kinds, and keep the latter free of weeds about their roots by forking or hoeing. Close pruning of all dead wood is beneficial and greatly improves the appearance of the trees.

The cleaning up and thinning of plantations for the first time should now be proceeded with. It is, however, not advisable to cut useful timber at this season, unless for immediate use.

Continue to tar or varnish fences, as recommended last month. The tarring of wooden sheds should also be attended to during dry and warm weather.

Continue the fencing and preparation of ground for next season's planting. Form new, and repair old roads in plantations; and still attend to the keeping down of whins and rank herbage in young plantations.

Clean main water-courses, wet ditches and drains; and execute all necessary repairs on the sides and banks of the same.

In the nursery keep down weeds, and perform all necessary pruning. Turn heaps of holly and other store seeds. Look over grafts, and untie them, and retie loosely if necessary. Budding may now be successfully executed.

Clean policy roads and walks, and keep down noxious weeds in the grounds and on margins of plantations.

Darnaway, N. B.

D. SCOTT.

IRELAND.

IN young plantations liable to rank growth of grass, furze, ferns, &c., men ought to be sent round to see that nothing interferes with the shoots of the plants. There is a strong vegetable growth everywhere this season, consequently the necessity of attending to young trees. Repair roads and bridges in the woods. See that shores and conduits are all in working order. Continue clearing out wet dikes, as recommended last month. Drain and make drives in game coverts. Mow grass and bramble from old drives. All works belonging to pheasant covers are best done before the birds are removed from where reared to the coverts. Clip ivy, yew, and holly hedges. Be careful to bury or burn the yew loppings; they are deadly poison to cattle. Now that all live branches which escaped last winter's frost are budding out, dead wood should be cut out. It is now one really sees the great damage done by the frost. Blanks are met with everywhere; old favourites which were once our delight are now standing leafless, in many instances barkless stems. Cut back all that there is any hope of starting from the root. The earth may be partly removed round the neck of the stem, which will, if any life remain, allow new shoots to come up.

Paint all out-door iron and woodwork. Cope stone walls with concrete or mortar. This is the proper time to proceed with all buildings where mortar is employed.

Ballinacourte, Tipperary.

D. SYM SCOTT.

WALES.

As the dressing of oak timber which has been stripped of its bark this season will now be finished, it should be removed from the plantations as soon as possible. Where undergrowth or coppice is desired, great care should be taken not to injure any of the young shoots throwing up from the stools.

Finish as early as possible the pruning of hardwood trees, and remove any branches and *débris* from open drains.

Continue the cleaning of young hedges, repair wire and other fences, and varnish or tar iron, wire, and wood fencing during dry and warm weather.

As last month, continue the clearing of long grass, ferns, whins, &c.,

from around young trees, so as to admit plenty of air, and avoid choking the plants. Cut all thistles and docks round the margins of plantations, and along the sides of drives and rides.

As the workmen are released from other work, the preparing of ground for planting, during the coming season, may be commenced. Where wet ground is to be planted in the autumn, no time should be lost in having it drained.

Material may now be got ready for repairing and gravelling carriage-drives and roads: where good gravel is not to be conveniently had, whinstone or other rock, broken small by machinery, makes an excellent covering for drives.

With mild and showery weather, weeds are difficult to keep down; it will therefore be necessary to keep the hoes going in the nursery, pleasure-grounds, and drives, &c.

Kimmel Park.

LEWIS BAYNE.



THE OLD OAKS IN CADZOW FOREST.

In the storm of the 26th November last, five of the old oaks in the chase at Cadzow Forest were levelled with the ground, where, after having their branches lopped off, they have lain ever since, the problem being as to how they were to be removed. Though in the last stages of decay, the immense trunks were weighty and unwieldy, and the timber hard and gnarled. Attempts at destroying them by fire having failed, it was resolved to blow them to pieces with dynamite, and the operation was successfully carried out on Saturday forenoon. Mr. Baxter, head forester, and his assistants prepared the holes for the charge, and the cartridges were rammed home and fired by Mr. Christie, representing Mr. Watson, Coatbridge, the district agent for Noble's Explosives Company. The trunk first operated on measured 18 ft., and was 4 ft. 6 in. diameter, and with three shots it was broken into fragments. The next was larger, measuring 33 ft. in length, and 4 ft. diameter, and the wood was comparatively fresh. Two double shots and a single one were expended upon it, and at each shot large fragments were projected high into the air, and crashed at long distances through the boughs of the adjoining oaks, much to the alarm and danger of those present, who sought safety underneath them. After the fifth shot the large mass was completely broken up, and the trunks of the other three trees, which were smaller, were similarly dealt with.



The letter which we print in "The Editor's Box" this month, on the Indian Forest Department, is worthy of the careful consideration of the authorities. There can perhaps be no greater justification of the strictures which we have occasionally felt it our duty to make on the management of our forests in India than the fact—if fact it be—that the Department is unable to compete with timber merchants in the disposal of the produce of the forests entrusted to its care.

* *

A very serious blight of caterpillars has manifested itself on the oaks in many parts of England during the last month. In Windsor Forest we have seen hundreds of acres of almost leafless trees, and in the New Forest the ravages of these pests are said to be equally remarkable. In the latter place we are informed that, while the *Quercus pedunculata* are without exception stripped and bare, the *Q. sessiliflora* or Durmast oak is quite untouched.

* *

In the Forest of Dean too we hear that complaints are general of the wide extension of blight in the forest oaks this season, caused by the larva of a small green moth. Many of the trees are almost denuded of their foliage. The pest is aggravated in that district by the scarcity of birds, particularly starlings and rooks, which formerly preyed upon the insects.

* *

A correspondent, writing from Perthshire, says that, in the western

part of the county, of which the town of Dunblane is the centre, the past winter has been unwontedly severe on rhododendrons, most of even the hardiest kinds being severely browned and losing their leaves under the influence of the hot sun. A great many will require to be cut down before they can make good plants, and many of the finer hybrids appear to be quite killed. Araucarias and deodars are severely injured, the points of the branches being generally killed. Other conifers have suffered in a similar degree, being all more or less affected, except the very hardiest of them, when placed in sheltered and dry situations. Such general injury to trees and shrubs has not been seen in the district during the present century.

* *

A correspondent writing from the West Highlands says:—"The alder trees in this part of the country are quite smothered with a white blight, similar to that which appeared on the larch trees here last season. In this case, no doubt arising from the nature of the food, the insect seems to be of a much larger species than that which emerges from the white fluff at the base of the larch leaves. So far this year the larch appears to be free from insect attack, but the leaves of the beech are covered with multitudes of aphids. It is thus seen that both alder and beech have to support an insect plague as well as the larch. The whole appearance of these trees is visibly affected by the myriads of insects, whose cottony-like surroundings whiten the foliage.

The hot dry weather of the early part of June caused a sharp attack of insects on a vast number of plants. The turnip crop was at its most critical stage, and the ravages of the "fly" have been severely and widely felt; so much so, that some of our correspondents mention that they have had to sow three, and in a few instances four times. The amount of loss thus incurred throughout the country is something enormous. Good cultivation, and the application of the water-cart in dry weather, are the best means of preventing an attack of "fly," by causing the seed to vegetate and grow up quickly, beyond the reach of attack. We are informed by a practical correspondent who has tested it for several seasons, that a *very slight dusting of hellebore powder*, applied in the early morning while the dew is on the plants, is a thoroughly effective remedy for an attack.

* *

The abundance of flowers which the common rhododendron, *Rhododendron ponticum*, has produced this season, when most of the other hardy species of rhododendron have flowered but sparsely, points to it as the most useful as well as the hardiest of all the species. Its rich masses of purple bloom are unrivalled in the display they make during the months of May and June. The varying shades of flowers on different plants, from dark purple, and soft lilac, to almost a pure white, harmonize most beautifully with the surrounding greenery. Either as single specimens on a lawn, as prominent plants in a shrubbery, or as cover or under-wood in a plantation, they are pleasing objects at all times, and particularly so in such a season as this, when the rigour of the past winter has so severely nipped the flowers of other, perhaps more showy but less hardy, species. The rhododendron should be planted much more extensively than we see it now,

as under-cover in woods and plantations. It is one of the few plants that are proof against the attacks of rabbits and other gnawing vermin; it thrives well under the shade of other trees, and forms a dry and warm cover for game, pheasants having a partiality for nesting in a cosy bush, and it will grow in any soil not strongly impregnated with lime; besides, taking everything into consideration, it is one of the cheapest and most permanent of cover plants.

* *

We note that the *Gardeners' Chronicle* of July 2 will contain portraits of two very well-known American arboriculturists, Prof. Sargent, of the Arnold Arboretum, Harvard University, and Prof. Engelmann, of St. Louis.

* *

We understand that a considerable stretch of plantation has been completed at Glencunie, on the Invercauld estate. The plants put in largely consist of hardy varieties, such as Scotch fir and larches, with an occasional spruce. The new plantation, the ground for which was substantially enclosed by a wire fence last year, surrounds Glencunie Lodge, which has lately changed its name to Glencallater Lodge, from which it stretches westward, crossing both the Clunie and Baddoch rivers, thence upwards along the face of Cornalarig Hill. Within its boundary it also embraces a great part of the farm of Cornalarig, and effectually closes the mouth of the Clunie and Baddoch vales at this point.

* *

During the latter days of May a destructive fire broke out in that part of Woolmer Forest situate in the parish of Selborne, and spread into the parishes of Greatham and Liss, causing considerable damage. It is estimated that 1,500 acres of forest have been burnt, including about 200 acres of

forest timber and 100 acres of seedling trees. The fire played great havoc with a plantation belonging to Lady Earle, in addition to destroying some trees, &c., on the estates of Lord Justice Cotton and the Rev. William Smith, and it was with great difficulty that several houses were saved from the flames.

* *

A correspondent from Sutherlandshire, N.B., informs us that the effects of the past winter have been very hurtful to the common Norway spruce in that locality. The trees are looking miserable, from the leaves all turning brown and threatening to fall off. Where the trees have suffered most, the young growth is not pushing freely, and many of the branches, as well as some of the trees, seem as if they will die off altogether. The same symptoms of the injurious effects of recent cold and wet seasons upon the spruce fir appear to be observable throughout a wide extent of the country.

* *

Every day brings us fresh evidence of the terrible havoc last winter has made among trees and shrubs. In certain localities, particularly in the North-eastern counties of England and the adjoining border counties of Scotland, scarcely any kind of tree or shrub has come scathless through the severities of the past three winters. We hear from several correspondents in that part of the country, that even the sturdy oaks, ashes, and beeches, the growth of centuries, show only too plainly the severe trial they have been subjected to, from the effects of which many of them will never completely recover. It is no uncommon thing to meet with many forest trees in low-lying spots standing quite dead, or so severely injured as not to be worth preserving, either for timber or ornament. When such trees as these, which are generally considered perfectly hardy, have been so badly injured, it does not surprise anyone

to learn that less hardy trees and shrubs are nearly swept from off the face of the earth in such frost-bitten districts. In some places the hardy hollies, yews, and rhododendrons are killed outright, and the Scots fir and spruces are "as brown as foxes," in fact, "scarcely a green leaf is left." It will take many years of favourable seasons before such places can recover their former well-furnished sylvan appearance.

* *

In accordance with a strongly expressed desire of the late THOMAS CARLYLE, a Memorial Oak was planted on the 29th of March, on the site of the house at Haddington, N.B., where the eminent Reformer JOHN KNOX was born. We now learn that under the direction of Mrs. ALEXANDER CARLYLE, a substantial wall, surmounted by a neat iron railing, is about to be erected, to enclose the spot, and protect the tree from careless or ruthless injury. The carrying out of her uncle's wishes in this matter must afford a source of melancholy pleasure to Mrs. CARLYLE, who has furnished the following appropriate inscription for a neat and durable tablet which is to be placed close to the tree:—"Near this spot stood the house in which was born JOHN KNOX, A.D. 1505. In commemoration an Oak Tree was here planted, 29th March, 1881, after the wish of the late THOMAS CARLYLE."

* *

The magnificent display of flowers on our hardy trees and shrubs, has been a common topic of comment with our country correspondents this season. Where the trees have not been injured by the severity of the winter, they appear to be unusually floriferous. Horse-chestnuts seem to be conspicuous by the abundance and extra size of their beautiful flower-spikes, and laburnums are likened to a "golden shower," by a Yorkshire correspondent. Lilac, guelder rose,

deutzia, ribes, azaleas, rhododendrons, hawthorn, sloe, gean, bird cherry, flowering ash, mountain ash, and many forest trees, have flowered most profusely. With such a favourable season for the "setting" of the flowers, we may look forward to an abundant seed harvest.

* *

As certain as the spring returns, we hear of cattle eating the prunings of yew and other evergreens, and dying from the poisoning effects of them. This year has been no exception; and almost every day brings us further evidence of the reckless folly of people, who certainly ought to know better, leaving the prunings of laurels, boxwood, and yew within the reach of stock, that no sooner partake of them than they immediately sicken and die. All such prunings should be at once collected and burned as soon as they are cut. The heat of the sun at the present season appears to develop their poisonous properties in an excessive degree, and by some fatuity stock eagerly devour them when in this dangerous state. Therefore no chance should be given to cattle to injure themselves by allowing the prunings to lie carelessly about in their way.

* *

The trustees of the late Earl of Dysart recently found it necessary to warn tenants by advertisement in the public press, that they are not permitted to cut down, lop, top, or prune any timber, wood, or trees, without written authority.

* *

The Highland and Agricultural Society of Scotland holds an annual examination of Students of Forestry, and grant first and second-class Certificates, according to the knowledge and efficiency displayed by the candidates. The Syllabus of Examination is by no means a difficult one to a fairly educated and intelligent candidate; and the Board of Examiners is unexceptional, com-

prising an ex-Director of Indian forests, three practical foresters, two professors of Botany and Agriculture in Edinburgh University, a civil engineer, and a chartered accountant. It was announced at a meeting of the Society, held on the 16th June, that the examinations for the Society's certificates in forestry took place on the 28th, 29th, and 30th March, when a second-class certificate was conferred on Mr. Alexander Inglis, Tynninghame, Prestonkirk, Haddingtonshire. The result is not encouraging, after three days' work of such an eminent array of talent, and Scotch foresters are not displaying the usual alacrity and shrewdness of their countrymen, when they neglect to take full advantage of the great facilities afforded them by these examinations, so as to qualify themselves for filling with credit and ability the highest positions in Forestry to which they can aspire.

* *

At the Meeting of the Scientific Committee of the Royal Horticultural Society, held on the 24th May, Dr. Masters exhibited cones of *Cryptomeria elegans*, from a tree growing at Redleaf, Kent. The cones appeared to be exactly similar to *C. japonica*, of which *C. elegans* is a peculiarly distinct form, retaining to the adult state the characteristic foliage of the young stage of many nearly allied conifers.

* *

It was recently reported in the daily press that the plane tree in Stationers' Hall Court, well known to Londoners as one of the finest trees in the City, was about to be cut down to make room for building improvements. We are glad, however, to learn from Mr. Heath, who has been making inquiries on the subject, that this is not the case, and that the projected improvements will not necessitate the removal of this fine City tree.



THE INDIAN FOREST DEPARTMENT.

SIR,—Will you permit me to inquire, through the medium of your widely circulated *Journal*, why the Forest Department in India cannot afford to sell railway sleepers at a sufficiently low price to do away with the necessity of importing creosoted pine sleepers?

A forest officer told me, not very long ago, that teak and sál sleepers were actually the cheaper, being more durable than creosoted pine. This, however, is contrary to the facts recorded in the *Indian Forester* for October last, which gives the average life of the three descriptions of timber as noted below :—

Teak	14 years.
Sál	13 „
Creosoted pine ...	18½ „

We are also told in the same journal that, “63,000 sál sleepers laid, time about four years, and renewals have been at the rate of 14 per cent. Government of Bengal is of opinion that this percentage is due to the use in the first instance of sapwood.” If this be the case, then the officer to whom the selection of the 63,000 sleepers was entrusted is greatly to blame, and it is to be feared that there will be a repetition of this wicked waste, in one form or another, until the favoured *saplings* have been allowed time to learn the difference between mature and immature timber.

Apart from railway sleepers, I have been told that builders and contractors find it more economical to purchase from timber dealers than the Forest Department; and the most conspicuous instance of this anomaly

is, that when the Darjeeling tram-line was under construction, Messrs. Burn and Co. found the Forest Department rates for sál (in the heart of a sál forest) so prohibitive, that they had to substitute teak for sál, and obtain what timber they required from Calcutta.

I should have referred this question to the *Indian Forester*, but I have not much confidence in that journal; it is too official an organ to admit of facts discreditable to the department it represents being recorded.

ASTUTIA.

TO PROTECT TREES FROM RABBITS.

SIR,—In your excellent May number is an article on the protection of trees from rabbits. Now, while from this distance we are looking to Europe for instruction in forestry how to clothe these wide treeless plains with trees, allow me in return to give a suggestion on the rabbit plague. A few years ago it was said, “First catch your hare, and smear the trees with his blood”; but now the nurseryman who wishes to protect his trees may be seen going up and down the rows with a bucket of bullock’s blood and a whitening brush, daubing the young trees. This does not injure the bark like tar, grease, &c. The rabbit being a graminivorous animal, does not like the smell of blood. That is my experience with Yankee rabbits—not knowing the peculiarities of your breed; but I can assure your foresters that “blood will tell.” Will some of your readers try it and report to the *Journal*? Another remedy is said to be effectual, but

which I never tried, and that is dog excrement mixed with water and applied with a brush.

With us fruit prospects are all that could be wished. Forest trees are making a wonderful growth. Crops of all kinds extremely promising, thousands of sturdy men and women arriving daily from Europe to till the virgin soil, bringing money to commence with and strong arms to do the work. The opening for them is great.

Very truly yours,

J. T. ALLAN.

Omaha, Nebraska, U.S.A.,

May 25, 1881.

[Will some of our forester readers test the "bullock's blood cure" on a fair scale, and report the result in the *Journal*?—Ed.]

PRICES OF FOREST PRODUCE AND COST OF WORK.

SIR,—In reading Mr. C. Y. Michie's interesting and instructive article upon this subject, which appeared in your May and June issues, I find the following, to me, curious statements:—"Beginning at the far north, and proceeding southward, I shall explain some of the change-producing causes in the price of wood. The counties of Caithness and Sutherland may be considered devoid of trees, since they only grow to the height of protecting walls. Instead, therefore, of selling, the proprietors have to purchase all the wood required for buildings, fuel, &c." If Mr. Michie does not write this in jest, perhaps he will in a future number be good enough to tell me from whence he got his information? Those who know the county of Sutherland best, are aware that in place of it being "devoid of trees," except those that "grow to the height of protecting walls," all sorts of pit wood have for the last thirty or forty years, at least, been exported by thousands of dozens annually, as thinnings only; fish-

curers in the district are well supplied with burn-wood; considerable quantities of birch bobbins have been manufactured for thread manufactories, and exported; and local demands have been well supplied with all sorts of deals and scantling, manufactured by either steam or water power. I saw a Scotch fir wood, a hundred and twenty years old, cut down for railway sleepers, and the trees were so large that a few root cuts, nine feet long, produced five sleepers 10 in. by 5 in. per cut. Some larch trees, thirty-three years old, have lately been thinned out of a hardwood plantation, some of which were fifty-eight feet high, with a girth a foot above the ground of 4 ft. 3 in. I passed through a thriving fir plantation the other day, of one hundred and fifty-eight years old. More need not be said about trees growing independent of "protecting walls." A good deal in the same way can be said of Caithness-shire.

I wish to call attention to two errors which appear to have crept into this article. In p. 86 it is said that the cost of sawing staves $\frac{1}{2}$ in. thick is for 1,000 ft. 3s. 6d. (I presume superficial feet are meant), and the sawing of boards 1 in., $\frac{3}{4}$ in., and $\frac{1}{2}$ in. thick is 1s. 6d., 1s. 3d., and 1s. respectively.

Now, wherever the sawing of staves cost 3s. 6d., I fail to see how $\frac{1}{2}$ in. boards can be cut for 1s., or 1 in. boards for less than 5s. These rates cannot include the expense of maintaining a sufficient and steady supply of water or steam power. I quite believe in hardwood costing one-half to one-third more money than pine or fir. Mr. Michie further says, "dressing props 7d. per dozen (common sorts), and 9d. per dozen for crown." I take for granted he means by "dressing props," felling and snedding, both common and crown, and squaring the crown props, and that the dozen means

that of 72 lineal feet. I think the half of those two rates will pay men better than 3s. 6d. per thousand sup. feet for slabs $\frac{1}{2}$ in. thick.

D. McCORQUODALE,
Dunrobin, Golspie. Forester.

TECHNICAL TEACHING.

SIR,—In the *Scotsman* of to-day, I noticed the report of an address delivered by Mr. Buckmaster, at Fyvie, before a meeting of farmers and others, on behalf of the Science and Art Department. Mr. Buckmaster propounded the following scheme for teaching the science of agriculture. He said: "Let us suppose a class of twelve persons meeting once or twice a week during the winter months under a qualified teacher, and the instruction given according to the syllabus prepared by the professional examiner in this subject. About the beginning of May these pupils will be examined by means of printed questions forwarded to the local committee or School Board. The written answers are returned to the Department for examination, and on the result of this examination the teacher makes his claim for payment. Suppose this class of twelve to pass with the following average results—and this was no hypothetical case, but was based on the results of the examinations in this subject, now extending over a period of four years: Two fail, four pass in the first division, six pass in the second division. This will entitle the teacher to payment of £2 on every pupil in the first division, which is £8, and £1 on each pupil in the second division, which is £6, plus £8, which is £14 on a class of twelve pupils. The payment may be more or less, according to the number of pupils. The fees and their apportionment, when and where the class meets, are matters of local arrangement. The pupils are encouraged by rewards, certificates, and small bursaries." Why

could not some similar scheme be adopted for teaching scientific forestry? Provision is made in Scotland for granting certificates to foresters, but no provision is made for their study of forestry otherwise than by practice and private reading, and there is a like lack of provision for the study of Rural Economy.

JOHN C. BROWN.

Haddington,

June 20, 1881.

NATURAL AND TRANS-PLANTED LARCH.

SIR,—In your last issue Mr. D. Stalker contributes a valuable article upon this subject. In referring to the diseases to which this tree is subject, I quite agree with him when he says, p. 93, "Another cause of disease in larch is, the planting of larch trees by tens of thousands annually in soils and situations quite opposite to that in which the tree has been found by experience to luxuriate and attain to a state of perfection." By "perfection" I assume he means good timber trees, say sixty to a hundred years old, and containing thirty to a hundred cubic feet; but if the growing of trees is to be regulated, like other marketable commodities, by the laws of demand and supply. I believe there is no pastoral district or deer forest in the country but would be greatly benefited by having fir plantations, composed partly of larch, within easy reach of them, for shelter in winter's storms. The larch, however young, being so much stronger and more durable than fir of the same age and grown in the same plantation, came to be used for fencing purposes from the time a tree grew to be only about the one-eighth of a cubic foot; I would therefore recommend all those who intend planting, even in moorish soil, to plant a fifth or a half of larch, mixed with Scotch fir wherever the surface soil is only from six to twelve inches deep, and resting

upon an open gravelly subsoil; and as they show symptoms of decay, they can be thinned out and turned to use if large enough, and if not, left there to decay and enrich the soil to the benefit of the growing crop of larch and fir.

Mr. Stalker says, pp. 96, 97 and 98, "The success and value of all crops, whether farm, garden, or forest, depend in a great measure on the quality of the seeds sown. That farmers and gardeners generally are fully cognisant of this fact is evident from the care and attention they invariably bestow in raising and procuring their seeds from the best possible sources. The consequences following the neglect of this precaution in the proper selection of annual seeds, even, is often ruinous and disappointing in the extreme to all concerned. How much more disappointing then must it be to the forest tree planter, after laying down a crop of larch, which takes upwards of a hundred years to ripen, to find after a few years' growth, that his plants are the produce of inferior and comparatively worthless trees, from which he cannot expect to obtain valuable timber trees."

"Larch will not thrive many years either in rich, deep, fertile, low-lying, loamy, or mossy lands; in such it is very liable soon to become a prey to the various diseases which the tree is so very subject to."

I said so much, pp. 20, 21, about the garden and farm crops, and the difference existing between their manner of growth, the object of growing them on the one hand; and, on the other, the object of young tree crops and their manner of growth, which I need not here repeat, but I venture to remind your readers that after the farmer, for instance, procures the best seed from the best sources and sows it in his richest and best soil, it is only a question of time in many parts for it to show a degenerating tendency. It may be

oats and ceases to yield the same average grain per acre. It is tired of artificial life, so to speak, and seeks back once more to its original and natural place among some of Nature's wild grasses, unless changed to some other district. Among other natural grasses we have growing in our nursery here is *Achillea millefolium*, milfoil, or yarrow, which grows a height of about three feet, and we meet it in high, dry, inland pastures beyond the limits of all cultivation hitherto, about 4 inches high; all this difference being due, not to change of quality of seed, but to the difference of cultivation and altitude; but this plant, like trees, is not an annual, like the farmer's crops of roots and cereals, but is, like trees, a perennial, and like them, also, is grown, not for its seeds or roots but for its tops. I therefore venture to affirm that Mr Stalker's simile fails to support his theory.

According to Mr. Stalker's statements, soil too rich or too poor causes larch disease, no matter how sound the seed or strong the plants such seeds produce. Apart from the question of exposure and altitude, the difference between rich and poor soils may only be that of so much more soluble food ready for the roots to take up in the one, compared to the other. Any one looking at a railway or a road cutting, especially in hilly parts of the country, cannot fail to see how abruptly the colour and texture of the subsoil changes; and it is well known that to the changes of subsoil are due the different proportions of the simple chemical elements of plant soluble food to be found there, and I think that one might as well expect an annual to thrive upon the best of food without a sufficiency of water, as to expect a tree to grow healthy and vigorously where all these elements are much out of proportion to the requirements of the tree.

In giving his reasons for plants from naturally sown seed being

healthier than from transplanted plants, Mr. Stalker says, p. 98, "Any weakly plants from inferior seeds, however, that may chance to grow up amongst the vigorous ones in the maiden soil, are soon suppressed by the luxuriant growth of the latter." No doubt they are, and leaving the making of good or bad quality of timber out the question, plants from the nursery produced by inferior seeds there, and planted in exposed places, and in soil much inferior to that of the nursery, must succumb in like manner, leaving the large or small size of trees entirely in the hands of soil, climate, and exposure.

Collecting seed in the new untried and expensive way Mr. Stalker proposes would not only increase the price to something approaching famine prices, but might tempt to questionable modes of adulteration; I therefore submit that it might be better for all parties interested in this seed and plant question, to let it remain as it is, to be regulated by demand and supply.

D. M'CORQUODALE,
Forester.

Dunrobin, Golepie, N.B.

HOW TO DESTROY FIELD MICE.

SIR,—The field mouse is sometimes very troublesome in plantations, in the manner described by "Aberdeenshire," at page 53. A good means of getting rid of them is to place a number of empty pickle bottles in the ground of the plantation infested by the mice, into which they fall and cannot escape from. The mouth of the bottle should be placed just level with the ground, and in the line of the runs of the

mice. These traps must be set in the early part of the winter, before frost sets in; after snow has fallen, the mice work under it, and cannot be got at by any effective means.

PERTHSHIRE.

WYCH ELMS.

SIR,—I should be much obliged if you could inform me through the medium of your *Journal* of what species of elm the enclosed twig is? There are some very fine specimens of it growing in front of this house; the air at the present moment being full of the falling winged seeds. The trees are over 60 ft. high and with a habit of growth more like a lime, the lower boughs being horizontal and spreading.

H. G. P.

Weasenham.

[The Scotch or Wych Elm,
Ulmus montana.]

BALSAM POPLAR.

SIR,—I should be much obliged if you could inform me through the medium of your *Journal*, what the enclosed is? It is a very old tree, and never has any blossom.

H. J. POWELL.

11th June, 1881.

[The Balsam Poplar, or "Tacamahac" of North America, *Populus balsamifera*. It was introduced to this country about 200 years ago, is one of the first trees to come into leaf, and bears a profusion of male catkins in spring, female flowers being more rarely seen, and seldom producing fertile seed in this country. It is easily propagated by suckers, and also by cuttings.—Ed.]



**THE LATE RIGHT' HON.
W. P. ADAM,
OF BLAIRADAM, N.B.**

It was with the deepest regret that we had to briefly announce in our last number the death of the Right Hon. W. P. Adam, Governor of the Madras Presidency, which mournful event took place, after a week's severe illness, at Octacamunda, in the Neilgherry Hills, the seat of the Madras Government during the hot season. It was only in November last, that Mr. Adam, having resigned his office as First Commissioner of Works and his seat for the counties of Clackmannan and Kinross, set sail for Madras amid the farewell regrets and hearty good-wishes of his countrymen. His career in that Presidency had already given promise of that success which has attended most of the efforts of his public life, but the brilliant future thus opening up to him has been suddenly closed by fell disease. As a clear-headed politician and able administrator he has had few equals, and his successful management of one of the great parties of State for several years, while in the cold shade of adversity, will long be remembered by both friends and opponents, each of whom equally esteemed and respected him.

It is, however, as a distinguished arboriculturist that he is best known among our readers, having for many years taken a deep practical interest in Forestry, and filled the office of President of the Scottish Arboricultural Society with the highest credit and renown. In the midst of a busy life, he was always ready and willing to labour in the interests and forward the objects of the Society, and to do everything that lay in his power to promote the best interests of Forestry. In him the Scottish Arboricultural Society has lost one of the best friends it ever possessed, and Arboricultural Science mourns the loss of a devoted student and able

expounder. An enthusiastic lover of trees, he devoted much of his spare time to their study and culture on his well-wooded estate of Blairadam, where the skill and foresight of several generations of his forefathers has clothed the bare and bleak uplands with a rich mantle of sheltering woods.

Mr. Adam was the son of the late Admiral Sir Charles Adam, of Blairadam, K.C.B. Born in 1823, he has died at the comparatively early age of 58, while still in the vigour of middle life. He was educated at Rugby and at Trinity College, Cambridge. He afterwards studied for the English Bar, and was called in 1849. Later on, from 1853 to 1858, having entered the East India Company's service, he was private secretary to Lord Elphinstone, Governor of Bombay. During this period of his life—in 1856—he married Emily, daughter of Sir William Wyllie, K.C.B. On his return home, he entered Parliament as Member for the united counties of Clackmannan and Kinross. From April, 1865, to July, 1866, he was a Lord of the Treasury, and again from December, 1868, to August, 1873, at which latter date he was appointed Chief Commissioner of Works and Buildings. This office he held till the dissolution at the beginning of 1874, and when the present Government succeeded to office he once more resumed the duties of the same post. In the autumn of last year he was appointed to the office of President of Madras, in succession to the Duke of Buckingham, where his life has been suddenly cut short in the midst of a most useful and meritorious career.

**SOLUBLE FIR TREE OIL
INSECTICIDE.**

WITH so many insect pests devouring our plants at this season of the year, we are naturally anxious to get hold of an effective and easily-applied remedy. Among many others which

we have tried during the past few years, there is none that surpasses, for ease of application and efficiency, the *Soluble Fir Tree Oil Insecticide*, manufactured by Mr. E. Griffiths Hughes, Victoria Street, Manchester. We have freely tested it on all manner of insect-vermin that infest plants, and it has proved itself more than equal to our expectations. Applied according to the directions furnished with each sample, it is generally effective and safe in its use. However, those who are experienced in such matters will apply the solution in greater or less strength as they see proper, but all inexperienced people cannot err in applying it in accordance with Mr. Hughes' directions for its use. Any one can use the Fir Tree Oil with perfect safety, as it mixes freely with water, which is so great an objection and danger in the use of petroleum and other oils. For plants and trees it may be used with a garden engine, syringe, or brush, or by dipping; in fact, it is of the easiest application, and possesses neither poisonous properties nor a disagreeable smell. It is sold in large or small quantities, and when nine gallons or more are taken, the price is very moderate. It will be found a useful and handy remedy for insects infesting nursery stock, and is worthy of the attention of all who are annoyed with them.

DEATH OF MR. JOHN GRIGOR, NURSERYMAN, FORRES, N.B.

AS shortly announced in our last issue, the death of this eminent arboriculturist took place at Forres, on the 19th of May. Mr. Grigor was born in Morayshire in 1806, and after receiving a good education at the local schools, he commenced life as a nurseryman at an early age, under the guidance of his father, who had followed that profession for many years. While still in his

teens, he proceeded to England to gain a wider experience of his profession, and spent some time in the Fulham Nurseries, which were then, as now, celebrated for the rich collections they contained of rare and beautiful trees and shrubs. The knowledge acquired here was usefully employed in after years in the embellishment of parks and plantations in the far North. Returning to Morayshire, in 1826, he set actively to work on his own account and established the Forres Nurseries, which have long been well known as among the largest and best-managed of the forest-tree nurseries in Scotland. The rearing of the "true" native Highland pine always formed a special feature in the Forres Nurseries, Mr. Grigor believing that it possessed qualities superior to any other variety of *Pinus sylvestris*, and took every precaution to secure pure seed from vigorous trees in their native habitat. However, it was not to the rearing of nursery stock that his greatest efforts were devoted. As justly remarked by the *Elgin Courier*—"Born among trees, love for them grew into his very nature. He became an enthusiast in Arboriculture, and his clear, active, and powerful intellect led him to take a wider view of his mission as a nurseryman than to settle down on the fertile plains around Forres, and grow plants merely for the neighbouring proprietors, who might come to him as buyers of them. The whole range of forestry he sought acquaintance with, taking up the study of it as a science, and proving everything by careful experiment." As an author, Mr. Grigor wrote many valuable papers on various branches of forestry, which received high awards from the Highland and Agricultural Society of Scotland. These papers duly appeared in the *Transactions* of the Society, and obtained for the author considerable popularity.

Equal importance and usefulness

characterized a comprehensive work on forestry, entitled—*"Arboriculture; or a Practical Treatise on Raising and Managing Forest Trees, and on the Profitable Extension of the Woods and Forests of Great Britain."* A second edition of the work had just appeared as the author passed away at a ripe old age from all worldly cares. The book has now a well-established

reputation as one of the best of its kind in the English language, and forms a desirable monument to the intelligence and perseverance of the lamented Author. Through energetic industry, he raised a large and lucrative business, the fruits of which he dispensed with liberality to public institutions, and in a generous hospitality to his friends and visitors.



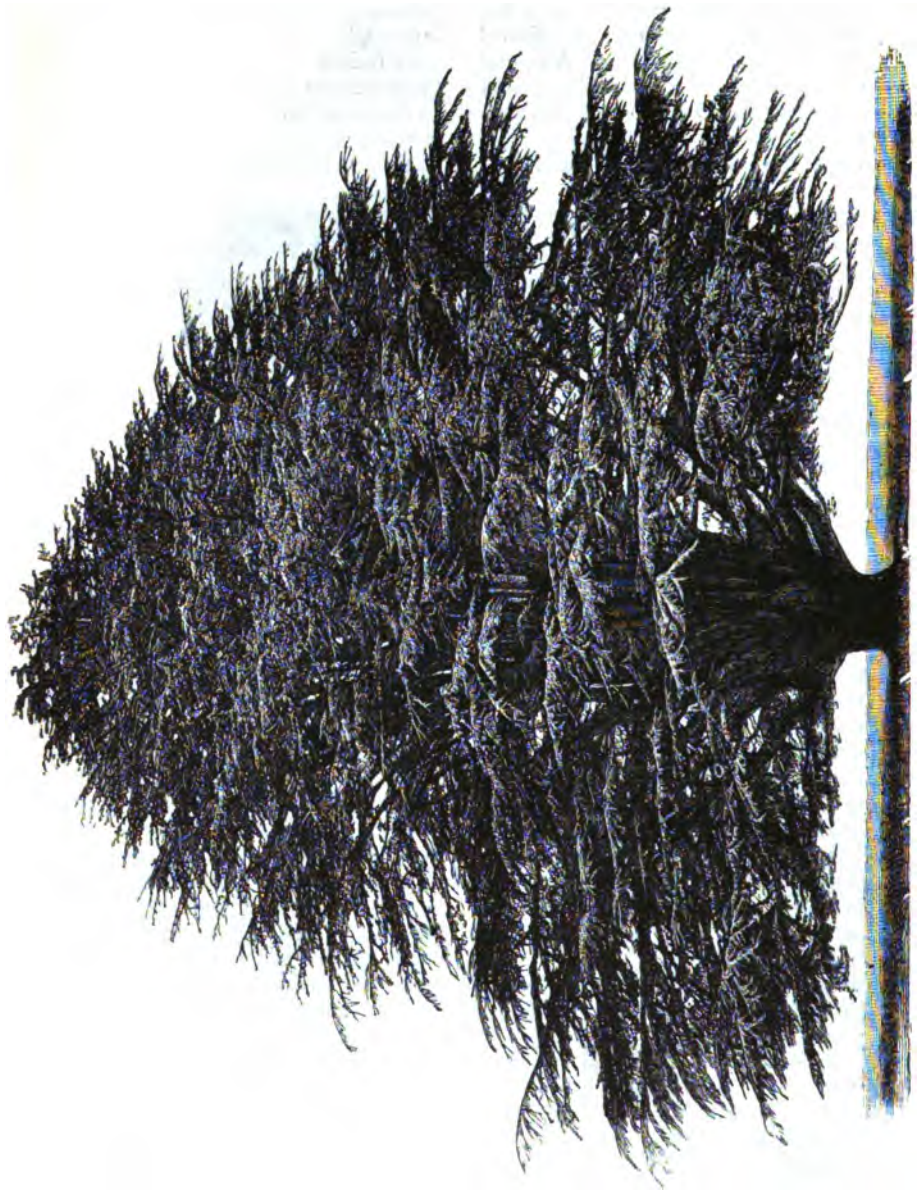
A Manual of the Coniferae: Containing a general Review of the Order; a Synopsis of the Hardy Kinds cultivated in Great Britain; their Place and Uses in Horticulture, &c. With numerous woodcuts and illustrations. James Veitch & Sons, Royal Exotic Nursery, King's Road, Chelsea.

As a useful book for practical people, this is the best work on conifers that we know of. It is essentially a practical work on the *Coniferae*, and designed to supply information about them which, as a matter of course, is not found in scientific works on the subject, or is but cursorily touched upon in them. After carefully perusing it, we are bound to say that the object of the authors has been successfully attained, and a manual produced which will be found a safe guide and instructor to all who may consult its pages.

The work is founded upon a "Synopsis of all the Coniferous Plants grown in Great Britain," prepared many years ago by Messrs. Knight & Perry, the predecessors of Messrs. Veitch in the Chelsea Nurseries. The present book, however, is a vast stride in advance of its excellent prototype. The numerous species and varieties of conifers

which have been since introduced, and the great progress made in the knowledge and culture of these favourite trees, have rendered necessary a complete revisal and rearrangement of the work, so as to incorporate all the important facts which have accumulated in the interval.

The first part of the work comprises a general review of the coniferous order, giving a brief description of the structure of the wood, the organs of vegetation and fructification, the secretions, economic properties, diseases, and accidents; their geographical distribution; and the scientific arrangement and nomenclature as adopted by the most eminent botanists who have studied the order. Although this part treats more of scientific than practical matters, still there is much practical information given therein that could not be imparted in any other manner. As an example, the following quotation shows what tribes of the coniferous family are most readily propagated by cuttings:—"The power of forming roots by pieces detached from the parent plant, or by 'cuttings,' is very considerable, but differs much in the different tribes. It appears to exist nearly in the same ratio as that of producing leaf-buds;



CEDAR OF LEBANON IN GOODWOOD PARK.

Planted in 1761. Present height (1881) about 65 ft.; length of principal branches 40 to 50 ft.



ARAUCARIA IMBRICATA AT DROPMORE. Present height (1881) 61 ft.

thus in the cypress tribe, in which the branches ramify repeatedly and produce laterals very freely when the leaders are, in garden phraseology, 'headed back,' cuttings take root very readily when placed in circumstances favourable for their development. In the sequoia and yew tribes the power of rooting from cuttings is almost as great as in the cypress and its allies. It is much weaker in the fir and pine tribe; some of the araucarias possess it in a high degree; the spruce and hemlock firs less so; it is feeble in the silver firs; and wanting, or nearly so, in the true pine."

The second part contains a synopsis of the genera, species, and varieties suitable for cultivation in Great Britain, classified in four tribes as follows:—1, *Abietinæ*—the Fir and Pine tribe; 2, *Taxodiceæ*—the deciduous Cypress tribe; 3, *Cupressinæ*—the Cypress tribe; and *Taxinæ*—the Yew tribe. The true firs are all classed under *Abies*, divided into sections for greater convenience in referring to them for practical purposes. The sections adopted are somewhat novel, but they are in accordance with the views held by the most eminent authorities of the day. They are as follow:—1, *Piceæ*—the Spruce Firs; 2, *Sapini*—the Silver Firs; and 3, *Tsugæ*—the Hemlock Firs. This part comprises the great body of the work, and in it the arborist will find abundance of interesting facts and useful information about every species and variety of conifer worthy of cultivation in the open air in this country.

We extract the following details concerning the Chilean pine (*Araucaria imbricata*) as an example of the treatment each species receives:—*"Araucaria imbricata.*—A tall tree of singular habit and striking aspect, caused by the formal arrangement of the branches in regular tiers or whorls, generally of fives, growing horizontally from its straight

upright trunk, and by its rigid, sharp-pointed 'Noli-me-tangere' foliage, uniformly covering the branches and their ramifications, and even the trunk itself during many years of its growth. Although the direction of the branches is at first horizontal, the lower ones in time become sub-pendulous or decumbent by their own weight; those forming the uppermost tiers curve upwards, giving the top of the tree a candelabra-like appearance. The branchlets are in opposite pairs, distichous, or whorled, like their primaries; the leaves are ovate-lanceolate, without footstalks, thickened at the base, very stiff, leathery, and sharply-pointed, about an inch long and half an inch wide at the broadest part, and of a bright green on both sides. Both pollen and ovule-bearing catkins are produced at the extremities of the upper branches, the former soon withering and falling off after the pollen is shed, the latter continuing to increase in size until it attains its maturity, which it does at the end of the second year, so that the branch on which it is produced has increased by two seasons' growth when the seed is ripe. The fertile cone is nearly spherical, from 6 to 8 in. in diameter; it soon falls to pieces after reaching maturity; the scales and seeds coalesce, and form wedge-shaped bodies more than an inch long, terminated at the top in a curved bract-like appendage.

"Habitat.—Chili, on the western slopes of the Andes, from about latitude 36° S. southwards to about latitude 45° S.

"Introduced into England in 1796, by Archibald Menzies, but first discovered about twenty years previous by an officer of the Spanish Navy.

"The preceding description applies to the araucaria as usually seen in the parks and gardens of Great Britain. In its native forest, where the trees are frequently much crowded, the lower branches are cast off like those of the firs and

pinus when growing close together, and merely crowns of foliage are left at the tops of the trunks, and these rarely occupying more than the upper third or fourth of their height. The strangeness of the aspect of these trees is increased by the large hedgehog-like globular cones placed at the extremities of the branches. Like the firs and pines, their roots spread near and at the surface of the ground, and on the declivities of the mountains creep over the bare rocks and barren slopes like gigantic serpents.

"Beyond the brief outlines sketched above, the limits of the geographical range of *Araucaria imbricata* are but imperfectly known. According to Professor Poeppig, it is found on the northernmost portion of its habitat, only on the higher slopes of the Andes, and always in proximity to the snow line, forming a belt of forest of from 1,500 to 2,000 ft. of elevation below it. Further south it descends to a lower elevation, the area over which it is spread gradually widening till it approaches the ocean at its southern limit.

"*Araucaria imbricata* was discovered in 1780, by Don Francisco Dondariarena, a Spaniard, who was at that time officially employed to ascertain if any timber suitable for shipbuilding were procurable in southern Chili.* It was also found very shortly afterwards by Drs. Ruiz and Pavon, two Spanish botanists, who went out to Peru in 1777, to investigate the forests of that country, with the special object of collecting information respecting cinchona and Peruvian bark, and who subsequently extended their explorations farther south. They were accompanied by a French gentleman named Dombey, but he returned to Europe after a short stay, and before Ruiz and Pavon sailed for Chili. It was to him that Ruiz and Pavon sent the first dried specimens of araucaria received in Europe, and by

him they were submitted to the eminent botanist Lamark, who named the tree *Dombeya Chilensis*, and thus Dombey's name became associated with the synonymy of the tree. In 1795 Captain Vancouver reached the coast of Chili, when Mr. Archibald Menzies, who accompanied him in the capacity of botanist, procured some cones and seeds, and also some young plants, which he succeeded in bringing home alive. He presented these to Sir Joseph Banks, who planted one in his own garden, and sent the others to the Royal Gardens, at Kew. One of the Kew plants still survives, and it is therefore the oldest, although not the largest araucaria in Great Britain. For many years the araucaria continued to be very scarce in England; seed could not be obtained, and the small quantity that reached this country from time to time failed to germinate. It was not till 1844 that Mr. William Lobb, while collecting in South America for our Exeter firm, succeeded in penetrating the araucaria forests, and thence brought home the first large supply of seed received in England, and from which very many of the fine specimens now growing in various parts of the country originated.

"It is worthy of note that *Araucaria imbricata* is the only conifer yet introduced from the southern hemisphere that has attained a timber-like size in England.* Its powers of endurance were severely tested in the memorable winter of 1860-1, when many fine trees were killed, but the casualties occurred under such a variety of circumstances, that it is difficult, if not impossible, to deduce any special law affecting the hardness of the tree. The following conditions are essential to securing fine free-grow-

* One or two *dacrydiums*, natives of Tasmania and New Zealand, that have attained some height in particularly favoured spots, can scarcely be called exceptions.

* London, *Arb. et Frut.*, p. 2, 436.

ing specimens :—The soil must have a thorough drainage, either natural or artificial, to prevent the stagnation of water at the roots; the trees should be planted in full exposure to sun and air, and if in an elevated situation, so much the better, a free open space being more conducive to their progress and well-being than a confined and sheltered one. In very dry soils the *araucaria* lives, but it loses its lower branches at an early age; the branches are slender, and frequently become flaccid, and the plant has a thin, starved appearance; it also loses its lower branches early when in a confined space, or in contact with other trees or shrubs, or when its roots penetrate into an ungenial subsoil; it languishes if within the influence of the smoke of towns; and the foliage takes a yellowish, sickly tint, if the roots enter and remain in stagnant water, or waterlogged soil, for a lengthened period. On the western slopes of the Chilian Andes, the native home of the *araucaria*, the rainfall is far more copious than in England, and the trees are also within the influence of the southern region of prevalent westerly winds blowing across the Pacific Ocean. Hence it is that in Great Britain they thrive best where the rainfall is greatest and the soil porous enough to carry off the water freely.

"The aspect of *Araucaria imbricata* is dark and massive, and large healthy specimens furnished with tiers of branches from the ground to the summit are even grand and strangely impressive. Whether solitary or planted in avenues it is the most effective of all conifers for contrast. The *Araucaria* Avenue at Bicton, belonging to the Right Hon. Lady Rolle, presents one of the most striking and remarkable arboricultural effects that can be seen in this country. Isolated specimens, imposing as they are, convey but a faint conception of the magnificent vista produced by a double

row of these strangely wonderful trees, with their dark plexus of branches and rigid bristling foliage, extending for a distance of 500 yards in straight unbroken lines. This avenue was planted in 1843-4, under the direction of the late Mr. James Veitch; it lines a portion of the roadway forming the eastern approach to the mansion. The trees are fifty in number, twenty-five on each side, those on the one side standing precisely opposite those on the other, the interval between every two trees being 63 ft. in this direction, and 54 ft. in the rows. The height of the trees varies a little, the tallest being (at the present time, 1881) about 37 ft. and the shortest not less than 30 ft. A few have cast off their lowest tier of branches, and there are two or three whose trunks are free of branches to nearly one third of their height; the uniformity is thus slightly but not materially impaired. The circumference of the trunks at 3 ft. from the ground ranges from 5 to 6½ ft.; the length of the lower branches of the most spreading tree is 17 ft.

"The specific name, *imbricata*, 'overlapping like the tiles of a roof,' refers to the tile-like arrangement of the leaves."

The accompanying illustration of the famous *araucaria* at Dropmore gives an excellent idea of the grand effect of this magnificent tree when growing in favourable circumstances where it can attain something approaching its natural size and habit. We are indebted to the courtesy of Messrs. Veitch for this illustration, and that of the splendid cedar of Lebanon, at Goodwood, which are a fair sample of the beautiful plates with which the book is freely illustrated; the minor details being also numerously illustrated by well-executed woodcuts.

In the third part, the various purposes for which conifers are planted are shortly described; several of the best known pinetums in

England and Ireland being named as containing very complete collections. Excellent lists are given of the most appropriate conifers for the park, the lawn and pleasure-grounds, avenues, hedges, belts, and screens, conservatory and winter garden, cemeteries and burial grounds, and for memorial trees.

The volume closes with a useful chapter on coniferous trees valuable for their timber, and a reference to the splendid collection of cones possessed by the authors in their museum at the Royal Exotic Nursery, Chelsea, and with a decidedly meagre index, which is quite out of keeping with the completeness of the rest of the work.

On the whole, we can thoroughly recommend the book to our readers, as a useful and trustworthy manual, in which they will find accurate information regarding every point in which they may feel interested concerning the valuable and beautiful coniferous family.

Manual of Injurious Insects, and Methods of Prevention. By Miss Eleanor A. Ormerod, F.M.S., &c. London: Sonnenschein & Allan. Edinburgh: Menzies & Co.

Through the courtesy of the authoress we have been favoured with an early copy of this important manual, which opportunely appears at a season when cultivators can best appreciate its usefulness. In a work of the kind, designed for the use and information of ordinary people, who have little taste for threading the dry details of science, and amidst which they almost invariably fail to find the much-wanted practical information they are in quest of, we do not expect to find the subject treated in accordance with exact science. Still, the authoress has so carefully selected and arranged the matter, that there is quite sufficient technical description given of every insect treated of, that no intelligent person can fail in determining the

name and habits of any of the common injurious insects which they may discover ravaging their crops. The book extends to upwards of 320 pages. It is entitled, "A Manual of Injurious Insects, with Methods of Prevention and Remedies for their Attacks on Food Crops, Forest Trees, and Fruit; with a short Introduction to Entomology," and is dedicated to the landowners, farmers, foresters, and gardeners of Great Britain and Ireland, and especially to those who have assisted in the work.

The object of the work is to give in as concise a form as possible some account of the insects that are commonly injurious to our food crops, forest trees, and fruit, together with the best methods of treatment which have been found useful in preventing attacks or in averting serious danger. It is not possible in the limits of a Manual intended to be a really "handy book" to offer anything like complete details of the life-histories of the insects; but most of the more important points in their appearance, with the various transformations they undergo in their different stages of existence, and their methods of attack, have been noticed. These concise descriptions are accompanied by excellent illustrations of the insects, which enable the reader to readily ascertain the name of the insects his crop may be suffering from. The different kinds of attack are classified under the three headings, "Food Crops," "Forest Trees," and "Fruit," and the crops, trees, and fruits in each class are arranged alphabetically, so that it is a matter of the greatest simplicity for any one to turn up at once the page on which it is most likely the insect devouring his crop will be found described. Suppose, for instance, that some of the points of the shoots of a Scots fir, or other pine tree, are observed to become brown and withered, while the rest of them remain healthy and green; on examination, it will

probably be found that the pith is hollowed or tunnelled out, and a small black beetle is seen at the upper end of the tunnel. Referring to the "Forest Tree" part of the Manual, under the heading "Pine," we find an excellent illustration of the bored-out pine shoot, and several figures of the pine beetle (*Hylurgus piniperda*), which from these and the description that follows we recognise at once as the pest that is injuring the tree. In a similar manner any other common insect pest is easily made out.

After the insect and its habits are described, the best known methods of prevention and remedy are discussed, so that the inquirer may easily learn all that is known on these important subjects, and be enabled to apply the remedy best suited to his case. This to the practical cultivator is the most important part of the book, and the authoress seems to have collected such a mass of practical experience as has never before appeared in any former work on the subject. The amount of instruction imparted in these preventive remarks would require a lifetime to acquire otherwise.

That nothing might be left undone which could facilitate the acquirement of a practical knowledge of injurious insects, a brief but clear "Introduction to Entomology" is prefixed, in which is given some information regarding the distinctive principles upon which the thirteen orders of insects are classified, a short description of each of these orders, and the chief characteristics of insects in their three successive states of life. To this is added a most useful glossary of entomological terms, and a copious index, and the text is freely illustrated with carefully-drawn figures of all the common insect pests treated of in the volume.

A "Handy Book" of reference like this, treating of injurious insects

on some easily understood plan, has long been a much-felt want among farmers, foresters, and gardeners, and to them it must assuredly prove a great boon. It is a marvel of careful investigation, industrious compilation, and really useful arrangement. The price at which it is published, 3s., places it fairly within the reach of everybody desiring authentic information upon the subject, and we anticipate that it will soon find a place in every country house, and be carefully read by every landowner, farmer, forester, and gardener in the kingdom.

OUR FOREIGN EXCHANGES.

IN successive numbers of the *Revista de Montes* received from Spain are papers interesting to students of Forest Science, irrespective of their nationality. In No. 103, is a paper on the Inundations of the Guadalquivir in relation to reboisement. In No. 104 appears a paper on the Rectification of the List of Public Forests in sequence to the contest relative to sales of trees referred to in the *Journal of Forestry*, vol. iii. p. 366; a paper relative to recent provisions for the management of forests, and a royal order relative to the preservation of the forests from destruction by fires. In No. 105, is a paper on the restoration and filling up of blank spaces in forests in the province of Segovia; and, in accordance with an arrangement not uncommon on the Continent, appended to these latter numbers are the first sheets of a serial volume entitled *Breves Consideraciones sobre la importancia industrial, mineral, agricola, y forestal de la alta cuenca del Llobregat*: Short notices of the industrial, mineral, agricultural, and forestal importance of the upper valley of the Llobregat, a river in Catalonia.

In the *Revue des Eaux et Forêts* is a translation of the new Forest Law of Hungary of June 11, 1879,

superseding the old law of 1807. At the International Congress of Foresters and Agriculturists held at Vienna in 1873, while the International Exhibition was open, the conservation of forests was urgently advocated, and in consequence of this one nation after another revised their forest laws and issued new codes. This was done successively in Poland, Switzerland, Saxony, Prussia, Italy, and Spain; and Hungary was not slow to follow.

Of the Hungarian law, M. Léon Bruand et de Gael, in a previous number of the *Revue*, had reported:—"This is a veritable Forest Code, embracing all questions relating to forests, exploitation, replanting, reboisement, transport of forest products, repression of forest offences, administrative and judiciary administration, and rules regarding competence, and forms of process. The Hungarian legislator, far from having sinned by omission, has rather gone into the opposite extreme. He has exposed himself to the charge of having made his law too complete, and of having occupied himself with a multitude of details which might not unreasonably have found their place in an executive decree, or even in simple administrative circulars. Following those issued by other nations, this law appropriates what is good wherever found; and as it proceeds it shows itself inspired by all the laws actually in force in these other nations of Europe. Along with numerous traces of the French Code of 1827, which became the source of much subsequent legislation, there occurs in the new Hungarian Code many of the special provisions made in the forest laws of other countries. For example, there are provisions for the destruction of insects injurious to forests borrowed from the law of Saxony; there is recognised the distinction between forests required for shelter and protection and forests useful only as a profitable crop, or

required for the production of wood, a distinction maintained in Switzerland and Italy and in Spain; and the same thing may be said in regard to the formation of associations for accomplishing the reboisement of mountains. Something similar may be said in regard to the right of expropriation; but unhappily the Hungarian legislator has boggled at absolute expropriation, and fearing to sacrifice the personal interest too much to the public interest, he has, following the French legislator of 1860, made a stipulation in favour of the proprietor, securing to him a right of resumption on repayment of the indemnity received by him, with repayment of the expenses incurred in the work: while, on the contrary, the new law of reboisement under the consideration of Parliament in France suppresses conditional expropriation to return to the general rules laid down by the law of May 3, 1841.

A most equitable principle, which it does credit to the Hungarian legislator to have formulated, devolves the expense of reboisement on the proprietors to be benefited by the works. If this be carried into effect we shall no longer hear the complaints so often made by the pastoral populations which, finding their present interest injured by the burden of reboisement laid upon them, unceasingly complain that "the mountain is made to pay for the safety of the plain." But the difficulty is to determine exactly the interests involved, and to apportion according to these the expenses amongst those interested; and this is moreover a question of appreciation and exaction upon which the law cannot pronounce without going beyond its sphere; it has laid down an equitable principle, and that is all that it should do in the case.

But Hungary has not confined itself to borrowing from others; it has in its own province made some provisions well deserving of attention.

We speak not of all the rules of police organization, and of competence, which depend on the political and administrative constitution of the country, but of proscriptions which may very well find a place in the legislation of other countries.

The greatest alacrity is enjoined on the authorities charged with lodging information and prosecuting forest delinquents; the personal liberty of every one is considered a matter of grave importance, and in the greater number of cases provision is made for the avoidance of mere preventive detention; and when the delinquent is unable altogether to escape this, the time spent in preventive detention is reckoned as part of the term of imprisonment to which he is condemned. This term is moreover comparatively brief.

If from some point of view—notably when the matter refers to expropriation in view of reboisement—respect for the personal rights of property seems primarily to engage the attention of the Hungarian legislator, this respect has nevertheless been subjected to some violation, in so far as the principle involved in the conservation of forests was the question. Here the law will become a hard one, not to say harassing and annoying; thus the Inspector of Forests has at all times a right to go into the forests to determine in what state they are; and the proprietor is bound to produce a scheme of management of his forest; to obtain for this the sanction of the authorities; to confine his operations strictly to this; and to abstain from certain exploitations, or from certain practices considered to be hurtful to vegetation. An entire section is devoted to the enumeration and repression of offences against the forest laws committed by proprietors in their own forests. As may be seen, the trammels put upon liberty of action by proprietors are numerous.

A chapter of the Hungarian law, which is original, is one which re-

lates to the transport of wood by water. It creates, not by concessions but by right of flottage, veritable servitudes burdening the various proprietors along the water courses in favour of the exploitation of the forests. As difficulties may frequently arise out of the conflict of interests involved, care has been taken to enumerate in detail the rights and the respective obligations of the owners of the woods floated, and of the proprietors or tenants of mills bound to be subject to the flottage of wood. What is made the important thing is to secure the transport of wood from the forests to the places of consumption.

Another peculiarity of the Hungarian law consists in the creation of a national forest fund, fed by the payment of judicial penalties or fines, and the sale of articles confiscated in accordance with the new law; which fund is destined to the assistance of works beneficial to the forests. This arrangement, which is altogether opposed to the financial regulations governing the public administration of forests in France and elsewhere, is one deserving of consideration.

To resume, 'his law, although it may not be very well arranged, and it is over-crowded with details which had been better placed in a public administrative regulation, constitutes a legislative document of which the study is interesting, and one the judicious application of which should render real service to Hungary. If we may be allowed to express a doubt in regard to the practical results which may follow its promulgation we may see it embodies here and there provisions too stringent to be always strictly carried out. Legislators should always keep before them the old adage, "He who demands too much gets nothing."

The law in question may not be adapted to the requirements of forestry in Britain, but it refers to much requiring attention in British dependencies and colonies.

In another number is a translation from the *Journal of Forestry*, of the paper on Forests in Sweden, vol. iii. pp. 851-854; vol. iv. pp. 100-103, 224-227.

From Prof. Dr. Hess, of the Uni-

versity of Giessen, there has been received the programme of the course of studies in Forest Science in that University from Easter, 1881, to Easter, 1883.

JOHN C. BROWN.



ERRATUM.—In our Return of Forest Prices, last month, the price realized for oak bark in Windsor Park was incorrectly given as £1 15s.; it should have been £3 15s.

DAILY CHANGES IN TREES.—Two naturalists, says a New Brunswick *Exchange*, have found that the trunks of trees undergo daily changes in diameter. From early morning to early afternoon there is a regular diminution, followed until twilight by an increase. This is repeated at night.

AMERICAN BEECH TREES.—Beside my house are six large American beech trees (*Fagus ferruginea*), and a finer group I never saw. They average 58 ft. in height, 6 ft. in circumference of trunk, and the branches reach out from the stems some 35 ft. on each side. They are clean-looking trees, with smooth light-gray bark, and a heavy leafage which is not subject to insect vermin. Although they are common forest trees with us, we have no nobler ones for avenues.—*Garden*.

BATH AND WEST OF ENGLAND SHOW.—Messrs. Bayliss, Jones & Bayliss, of Wolverhampton, were one of the largest exhibitors of fencing material in this show, which was held recently at Tunbridge Wells. Their samples include ornamental and plain fencing, which may be applied to a variety of purposes, from a park to the commonest form of enclosure; hand-gates, farmyard gates, wrought and cast, and hurdles for every description of live stock, complete an elaborate display of the specialties of the firm.

FOREST CULTURE.—Probably fifty years hence there will be abundance

of trees in the West. Agriculturists are rapidly awakening to the necessity of planting them. The Fort Scott and Gulf Railroad Company has begun the planting of hundreds of acres of trees on its lands. A Boston capitalist has engaged a company of raisers of forest seedlings in Illinois to break and plough a large area in Kansas, and plant no less than 2,720 trees to the acre, and cultivate these until they shade the ground.—*Manufacturer and Builder*.

ABIES ENGELMANNI GLAUCA.—Foremost among all conifers, on account of its beautiful glaucous hue, is this variety of *Abies Engelmanni*, and when covered with its young growth it is still more striking. When planted along with other and more sombre-hued kinds, the silvery gray foliage of this, so different from that of its associates, renders it conspicuous. It is of a dense pyramidal habit, and has been in no way injured by the last two winters—at all events around London.—*Garden*.

THE HEMLOCK SPRUCE.—We have spoken of the beauty of the foliage of trees this year, and have lately been greatly pleased with the budding Hemlock Spruce in many different gardens. On Monday we came upon some trees which at last justified the praise which it receives from those who know it at home. In Bagshot Park there are trees of the Hemlock Spruce which in grace and dignity equal the Cedar, if indeed, in some respects they do not surpass it. Having so often seen this tree in almost a shrubby state, we had doubted its value and asked our many

correspondents to tell us what it really was at home. Probably this peaty district suits it better, and that it is a tree that will not do equally well everywhere.—*Garden.*

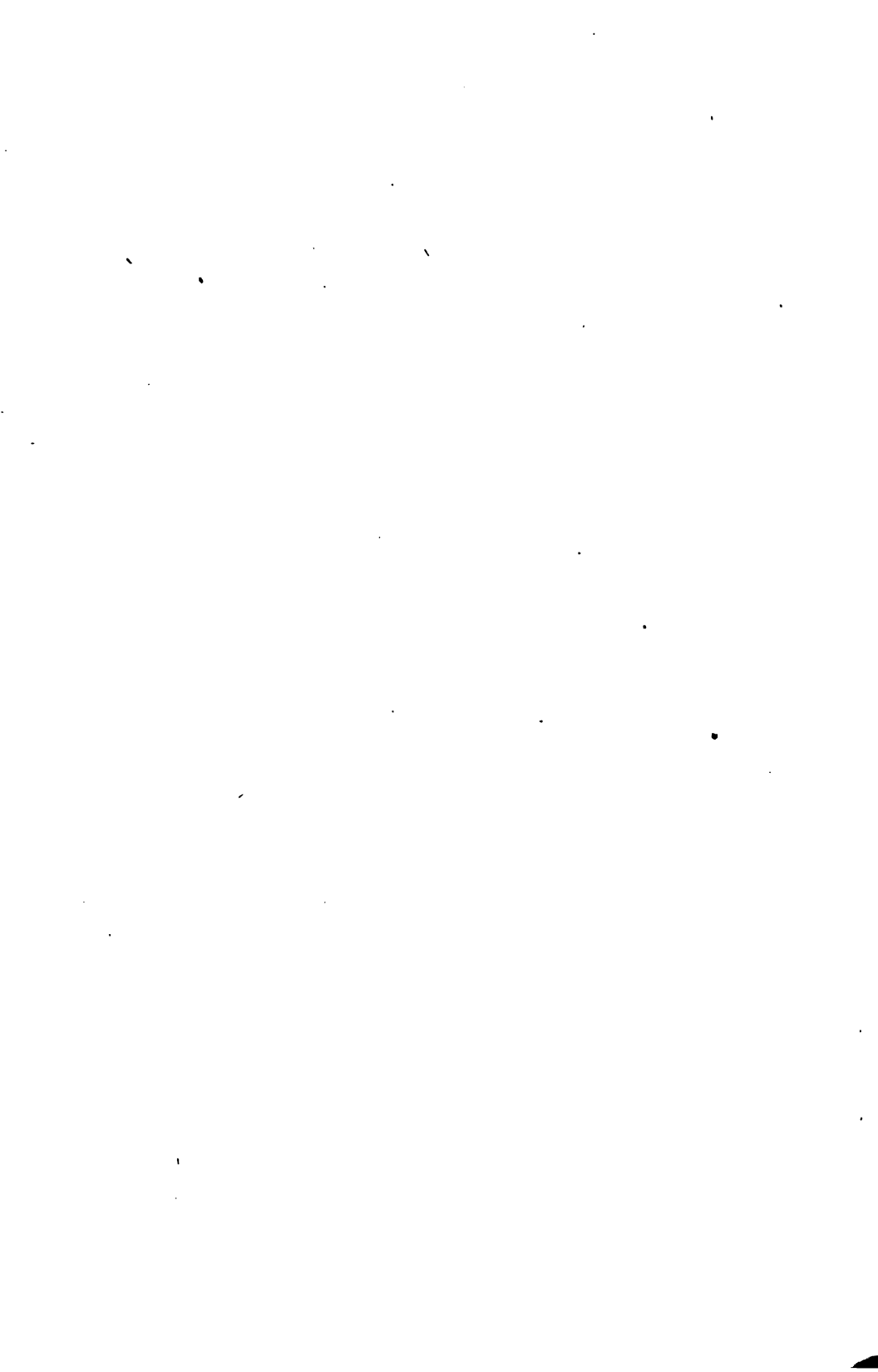
EXTENT OF WOODS IN ANGUS AND MEARNS.—There is a considerable acreage of wood in Angus and Mearns, which the statistical reports for 1812 and 1872 show as follows:—Forfar, or Angus, in 1812, 47,073 acres, and in 1872, 31,857 acres; Kincardine, or Mearns, in 1812, 21,131 acres, and in 1872, 23,153 acres. This report indicates a decrease in the county of Forfar of about 15,000 acres, as compared with 1812, and in Kincardine an increase of about 2,000 acres. In Angus, the wood is spread over all the county, but is principally to be found on the Sidlaw Sills and along the spur of the Grampians, and the longitudinal ridges of conglomerate in Eastern Strathmore. Very few plantations of any extent are in the arable districts proper. They either occupy hills too steep for cultivation or else soil too poor to be suitable for bringing under the plough. The principal plantations in Kincardine are along the spurs of the Grampians and in the Deeside district of the county. The latter is especially well suited for wood, and but a very indifferent subject for agriculture. A great breadth of it is underwood, many of the hills being wooded to the summits. The wood grown is principally Scotch fir, considerable plantations of larch where the soil is suitable, and also quantities of spruce. The ordinary hardwood trees—ash, plane, elm, beech and oaks—are extensively grown as standards between fields and along roadsides. This is very common in Strathmore. Almost all the residences of the country gentlemen have their policy parks ornamented with these trees, and, as a rule, there are a few about almost every homestead; all of which combined impart to the general appearance of the country a very sylvan aspect.—From *Lawson's Agriculture of Forfar and Kincardine*.

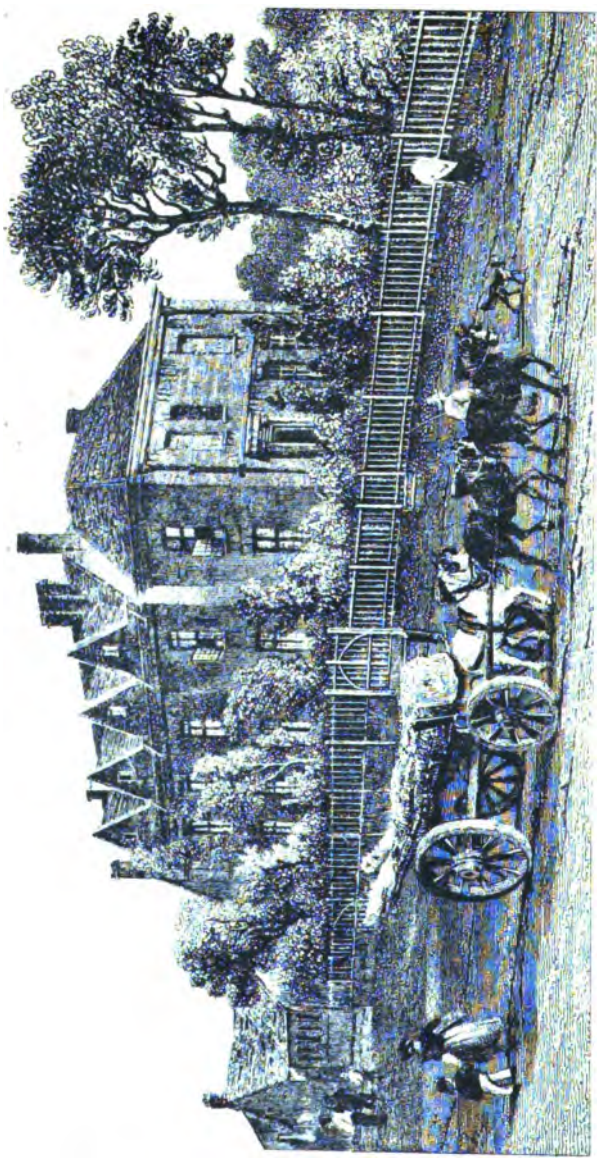
STEALING TREES.—Joseph Pitt and George Hammerston, of Whiteshill, were charged before the Whitminster Petty Sessions with stealing 82 larch trees from a plantation at Stockend, the property of Mr. H. Butt, of

Bristol. The loss of a large number of young trees was proved, and P.-C. Griffin proved that he found the prisoners had sold a quantity of kidney-bean sticks to Mr. Motley, and, on comparing the stumps left with the sticks, was satisfied they were cut from the wood. Mr. Motley proved that he bought them from the prisoners. Mr. Davis, who appeared for Pitt, urged that he only went with the other prisoner to sell the sticks without knowing where they came from. The bench fined both 20s., 3s. 6d. the value of the sticks, and 6s. 8d. costs, or a month.

THEFT OF YOUNG TREES.—On June 14th, before Mr. Ross, at Tain, William Fleming, a tramping saw-trimmer, was charged with having, on the previous day, from the policies of the home-farm of Edderton, cut down and stolen ten or thereby valuable young hardwood trees, the property of W. E. Cattley, Esq., of Edderton. It appears that Fleming, when his other trade is quiet, takes to making walking sticks. Here he found the right material, as he thought, and, as already stated, cut down several promising young trees, leaving on the ground the portions of them that he found unsuitable. Fortunately he was suspected, and information being lodged with the police at Tain, he was apprehended there the same evening. He pleaded guilty to the charge, and the Sheriff having characterized his conduct as very bad, sentenced him to fourteen days' imprisonment.

LOMBARDY POPLARS.—Though of formal appearance when in lines, these noble trees present a fine effect when seen in groups, or when singly towering up amongst surrounding trees of a more compact habit. In the park at Syon, and within a few hundred yards of the Thames, where the soil is moist and alluvial, there are some noble trees of this Poplar of singularly even height, reaching to about 125 feet from the ground. So robust and healthy are these that there is reason to believe, if left untouched by the modern destructive, the builder, these trees may yet add some 20 or 30 feet to their present elevated proportions.—*Gardeners' Chronicle.*





OLD KING'S HOUSE, LYNDEHURST.

THE JOURNAL OF FORESTRY & ESTATE MANAGEMENT.

THE NEW FOREST.

THE frontispiece presents to the readers of this paper the Old Queen's House at Lyndhurst, not as a picture of its present state, but interesting as displaying the difference between the house as it was some few years ago and the handsome edifice of to-day. It has marched with the times, and its improvement may be accepted as an indication (as in the case of many another building, sacred and secular) of a corresponding advancement in the whole administration connected with it.

The present house is spacious enough for the transaction of the very considerable amount of business of which it is the seat; and also for the residence of the chief local official of the forest. Should Her Majesty see fit to visit this very interesting part of her dominions, and survey the time-honoured trees and thriving plantations of the New Forest, the Queen's House in its present condition need not blush to receive her. In the adjoining church she would behold one of the finest altar-pieces which ever preached a sermon to the spectator, Leighton's picture of the Ten Virgins; and from the elevated churchyard she would look over a woodland landscape that would not disappoint the eye, even after lordly Windsor.

There is reason to believe that a Royal lodge stood on the same foundations as the present house so far back as William Rufus. The hall and the middle of the house date back to the reign of Elizabeth. Some addition to the latter was made in the reign of Charles the Second; but the merry monarch's pleasures were not so robust as to qualify him for a sportsman; there is no tradition of his having made this a hunting lodge for himself. George the Third was the last of our sovereigns who paid it a visit. The royal stag-hounds hunted the forest for a short time annually till 1851, the year of the Deer Removal Act.

Of the Queen's House, the part to which the chief interest of the visitor attaches itself is the hall in which the Forest Courts are still held. Here the Verderers try cases which fall within their province,

misdeemeanours in connection with "Vert and Venison." It is almost the only relic of the old Forest Laws. Some improvements were made in the Old Hall in 1851, and its present state shows signs of more recent care and taste. The walls are appropriately decorated with branching antlers; and in one place hangs a stirrup, which some have desired to connect with the saddle of the Red King, though its style forbids the anachronism, and its size would have made it dangerous for any foot that was not gigantic. It is matter of history that William Rufus was vain of his foot,* and particular as to the shape



THE GREAT HUNTLEY WOODS (page 234).

and even price of the boot to fit it. But the use to which this antique stirrup has been put in later times brings it into keeping with the spirit of the ruthless king. For many generations it was an illustration of the old severity of the Forest Laws. Whatever dogs in the forest could pass through the stirrup-iron as a gauge, were considered harmless, and allowed to be at large; those that were too large to pass this crucial test were "expeditated" (not *expedited*)—SHORTENED

* Pearson's "History of England," vol. i., page 419.

IN THEIR TOES, and thus rendered incompetent to overtake the deer. The provision in Henry the Third's Forest Charter in favour of the human poacher (and the amelioration itself almost makes one shudder)—"No man for the time to come shall lose *life or limb* for taking our venison,"* does not appear to have extended to the cottar's dog.

Such cruelties have passed away; and now (so completely has the pendulum swung in the opposite direction) the rounding of a hound's ears, or the cutting of a cock's comb, may subject a man to a summons before the magistrate.

From the Queen's House as a centre neither prince nor subject can take any one of the roads which radiate from it without the humanizing delight which flows from natural beauty; and whoever sets his foot here for the first time will feel that he treads on haunted ground. The scenes and times of the early Norman sovereigns will associate themselves with him in his rambles; and farther back, by a thousand years and more, historical recollections will carry him to the Roman occupation. The forest of to-day was a forest then, part of that boundless wood which covered at least the half of Hampshire, and stretched away with little break into the Andred Weald; the forest that ran through three counties in Alfred's days and was reckoned 120 miles long and 30 broad. The name New Forest will not mislead us as to its antiquity; it was well known to the Romans as the *Silva Alauna*. Its British name was *Ytene*. Even its present appellation goes back to the Norman kings, when those royal patrons of the chase dedicated it to their own exclusive sport, and placed some 92,000 acres beyond the limits of cultivation, in the true meaning of the word forest—*foris*.

Of this vast space nearly one-half is open ground, and probably always was so, not being adapted to the growth of timber. Of the richer portions of the soil 26,000 acres have been alienated from the Crown in the course of several reigns,—a prodigality somewhat balanced by the advantage of a resident gentry. On the open waste enclosures have been made to the extent of nigh 20,000 acres, the earliest of them dating back to the beginning of last century; and a third of this space has again been thrown out as needing no further protection.

Setting the unenclosed waste at 38,000 acres, and adding to this what has been alienated and what has been enclosed, it will be found that out of the 92,000 acres which formed the hunting ground of the first Norman kings, there remains now of the old primeval woods barely a space of 10,000 acres;—yet sufficient surely to delight the naturalist

* Pearson's "History of England," vol. ii. page 122.

and inspire the artist,—enough to fire the imagination and train the eye,—enough to link the present with the past.

The visitor to the New Forest must not expect to find himself surrounded by the tall colonnade of a virgin wood or by the gloom of a great impenetrable bush. Gravel roads lead him past beautiful residences, through cheerful villages, and here and there to a thriving town. The Conqueror has left behind him more than one church to protest against the calumny of his having “made a solitude and called it



BARLOW'S MOOR WOOD (p. 234).

peace.” Several parks add the grace of cultivated beauty to the wilder charm beyond. Even the barren moor, with its monotony, contributes to the vastness of the scenery, dividing and distancing the woods it lies among. Two considerable rivers hem in this great chase, the Anton and the Avon; and two others which lie between, assist the drainage of the country, receiving into them many a rivulet of golden-brown water from the gravel. To the eye trained to make its own pictures, nowhere will be found more abundant means of

enjoyment. Few are the cottages which do not look like homes ; scarcely a garden which is not prolific ; the myrtle is spared by the sharpest winter to bloom outside upon the walls. There is an air of rest and freedom pervading all around which deepens the enchantment. Not a woodman's lodge which does not bespeak homely peace and plenty ; and among the dwellers in them are to be found some of the most manly forms and intelligent minds which have ever grown up among the silent woods. Converse with them and you will hear words which have to be interpreted, and expressions which are not only technical but picturesque. In the language of the forest the bark is "*roach*" *



VIEW IN BUSHEY BRATLEY (p. 234).

not rough ; and the rule for autumnal planting is conveyed in the words, "Carry the tree green to his grave." Lodge with them for the night, if you are belated, and you may still hear the stag "bell," though the herd which Rufus loved so well is supposed to have been disafforested and improved off the face of the land.

No lover of the picturesque but must regret that the dappled deer are so reduced in number as to be seldom seen in the glades of the New Forest, or springing from the fern. But to replace them as they were a century ago would again go far to swell the expenses of this

* The *roach* fish may be so called from the special roughness of its scales.

vast tract beyond its income—would again bring back the poacher in his most desperate form, if it did not recall the days when the stolen buck was hung up in a larder where few would look for him—the tower of the neglected church! * Instead of the stately deer the tourist must be content with the shaggy ponies on the moor; and though they have not had a Katerfelto for their sire, like the Exmoor race, their bright eye and lithesome step betoken blood and breeding, and promise a spirit and endurance that might satisfy the Cossack of the Don himself.

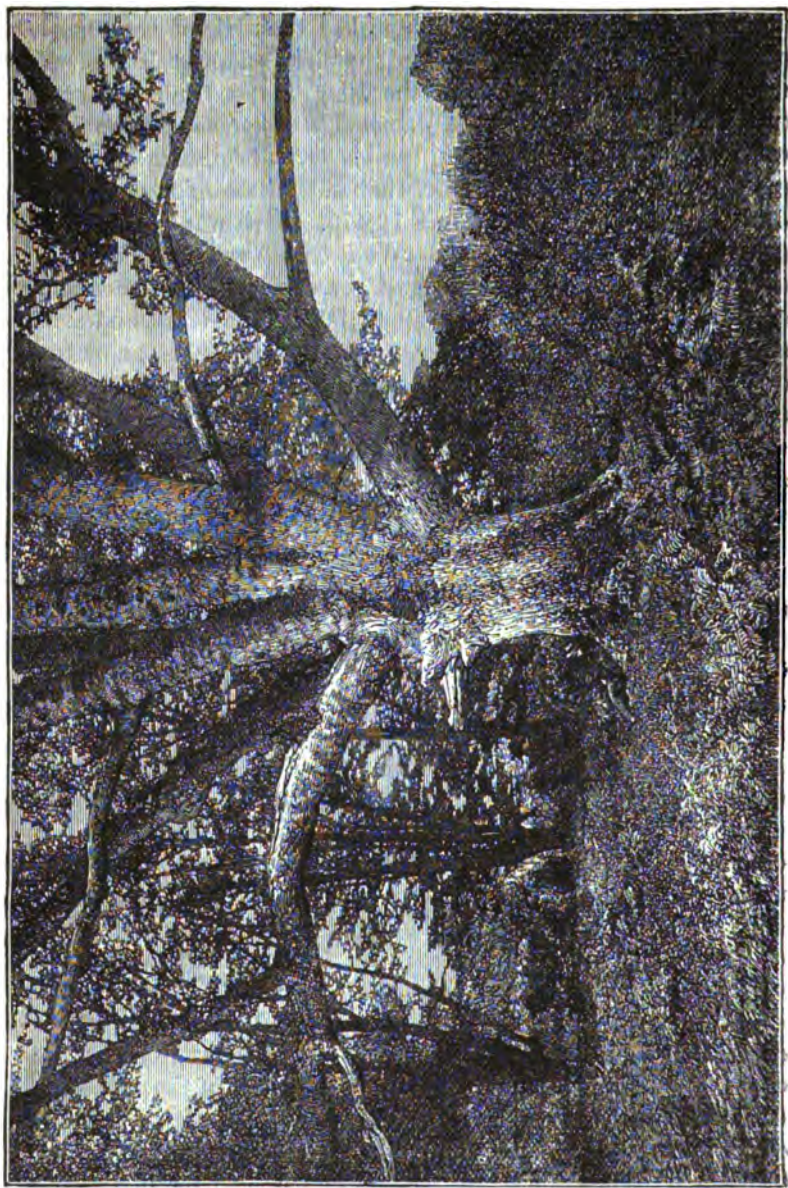
The principal object of this paper is to place before those who are out of reach of this historical forest some such description of it as may inform them as to its present aspect and state, and possibly invite them to examine it for themselves. Whether any such opportunity should occur or not, the lover of forest scenery would do well to possess himself of Wise's "*New Forest*," which in respect to all that is requisite for a perfect book upon the subject, information of every sort, deep research, eloquent description, tasteful and plentiful illustration, cannot fail to prepare the visitor to the forest for the fullest and most intelligent enjoyment of its scenes and beauties. And here we would express our thanks to Messrs. Sotheran and Co., the present proprietors of this beautiful volume, for their kindness in allowing us to use in this article a few of the Illustrations of *New Forest Scenery* with which Mr. Wise's book abounds.

A few words will be all for which there is space here as to the history of the forest since the early Norman times. From the earliest times the Royal prerogative was in no case more strictly enforced than with regard to the Crown forests. Consequently, every movement in favour of popular rights was attended by an attempt to ameliorate the Forest Charters. The Barons who wrung from the reluctant John the great Charter at Runnymede, aimed at a limitation of the feudal power of the sovereign over his forests. But it was not till the next reign that the *Charta de Foresta* was drawn up on the terms which had been already settled before the death of John. That still more important Act, the *Confirmatio Cartarum*, which followed in the reign of Edward I., was accompanied by a Perambulation of the Royal Forests, the second after the survey recorded in *Domesday Book*. Twenty-one years later another Perambulation was made in the same reign of Edward I., ending in the contraction of the New Forest, somewhat within the limits to which it had been extended by the early Norman kings. This limitation appears to have been a settled one, as it corresponds with the Perambulation of Charles II.'s reign, the bounds of which are followed to this day.

* Fact.

Of the condition of the New Forest during all the intervening period between the Plantagenets and the Stuarts, we know but little. Whatever the laxity of its government or management may have been, no depredations or abuses of the three preceding centuries could have rivalled the waste which distinguished the time of the Stuarts. In the century which lay between the first and the last of this dynasty, the great denudation of the New Forest timber occurred. It is on authentic record that in James I.'s reign there were in the forest 124,000 trees fit for felling, besides trees beginning to decay, which would yield 118,000 loads of timber. In the reign of Anne all that were reported serviceable were 12,476. Such was the reduction between the years 1608 and 1707. We need not wonder at the rapid diminution when the forest keepers were allowed to indemnify themselves for their arrears of wages by felling the trees, and maids of honour were assigned the timber of whole districts. The petition of an officer may still be read who applied for a grant of 2,000 trees out of the New Forest to reimburse him for his advances to his company. The elements themselves seem to have assisted to a peculiar extent in the destruction of the forest timber during this wasteful period. In 1703 Evelyn bewails the uprooting of 4,000 of the best oaks of the New Forest by a hurricane, perhaps the most violent in all its history.

Something had been done, it is true, in the reign of Charles II. in the way of planting. Three hundred acres were enclosed in 1669; and in William and Mary's time a more serious attempt at reproduction was made, and power was obtained from Parliament for the planting of 6,000 acres; but this power was not exercised farther than to the extent of 1,022 acres. No other effort in this direction was made till the plantations of Philipson and Pitt, in 1755, and these consisted but of 230 acres. In the year 1789 a Commission of Enquiry was appointed, which revealed a sad state of neglect and speculation. Cattle were turned out without a right, furze and heath were cut by those who were not entitled to the privilege, marl was dug by any who pleased, the overstocked deer died by hundreds, rabbits were destroying the young timber, the old was largely stolen; but no effectual check was put to these abuses till 1848, when a fresh Commission reported the existing state of the New Forest to be absolute anarchy. The improvement began with the abolition of the deer, whose presence in large numbers, it must reluctantly be confessed, has ever proved injurious to the trees and fatal to the morals of the forest. Another step in advance was taken when a Register of decisions was made on claims to forest rights; names were enrolled and published, with the amount of privileges belonging to each; systematic draining was adopted; and much regular work was



THE KNIGHTWOOD OAK (p. 284).
[From "Our Woodland Trees," by permission of Mr. F. G. Heath.]

thus found for the foresters. Not the least of the improvements was the establishment of a nursery at Rhinefield.* This nursery, however essential we may think it to the maintenance of the largest forest in England, is now almost discontinued. What is to be done with it? Two years ago the superfluity of it was sold by auction. The public was satiated without the ground being cleared; there remain blocks of young oak (choice Durmasts among them) crowded as pins in a paper, growing almost wilfully into a hopeless tangle. Here, too, are conifers, which any lover of them would give the world to have standing singly on his lawn; sequoias spearing upwards; Douglas firs, rank as weeds; araucarias, bushy as cembras, their bottom branches strewing the ground. They are crowding and spoiling each other. What is to be done with them? Removal would be impossible; to let them stand as they are, would, in five years, spoil all. So well chosen has the ground been for this kind of tree, that the very luxuriance of their growth has ended in perplexity. Take as an instance of how they like the soil and climate, the Douglas fir which was planted to commemorate the fortunate marriage of the Prince of Wales. In the seventeen years which have elapsed since then, it has grown from 6 ft. to 40 ft. in height, and with a well-proportioned spread. It should be allotted a quarter of an acre to itself at least. What is to be done with the beautiful remnants of an abandoned plan, and with the ground which they cumber by their luxuriance? No better spot for a pinetum could be found; and who could deny that such a use of it would be an additional charm to the forest? If economy is to regulate its treatment, then a good house instead of the ruined one, and a judicious laying out of the grounds around it by such a landscape gardener as the late Mr. Page, of Southampton,† would offer an unrivalled temptation to any one who might wish to plant himself in the midst of the most massive woodland scenery, and among the choicest firs already grown to perfect beauty. Place this plot of ground in the hands of an enterprising individual of taste and capital, and give him a lease which should make it something like a freehold, and the melancholy spectacle of a meaningless waste would soon change into order, beauty, and profit.

As with the Rhinefield Nursery so with the fir plantations in general. The firs have grown with a mischievous freedom: there are, it must be confessed, *thousands* of acres which should be cleared at whatever present sacrifice without the loss of a single winter, if the precious oaks among them are to have the slightest chance of

* A name perhaps derived from the term commonly applied to dykes in the West, and used by Macaulay in his description of the battle of Sedgemoor.

† We know of no successor to him except his favourite pupil, Mr. Abraham, of Woking.

being anything but a failure. The most vigorous improver might well quail before the work to be done, not knowing where to begin.

With this brief sketch of the history of the forest, the subject of this paper may perhaps be divided advantageously between the present condition (*a*) of the old timber, and (*b*) of the young plantations. There lies between these (as in human life) a period of adolescence, full of interest and importance, the state of those plantations which have been "thrown out" of protection. It may be more convenient to speak of these still as plantations, as their special interest will lie in the evidence they offer of success or failure in planting.

(*a*) Of the most aged trees, perhaps the oaks in Brockenhurst Park are the oldest, as they are the largest specimens in the forest, two of the three measuring respectively 20 ft. and 23 ft. in circumference, at 4½ ft. from the ground. They are mere trunks, all their larger branches lost long ago. There is little room to doubt that they are old enough to have been looked on by the Conqueror and his son, and perhaps by some previous generations of the conquered. Next to these in antiquity are the Boldre Wood oaks, standing near the keeper's lodge, on the north side of that enclosure. These two are coeval with the early Norman times; as great a contrast as can be imagined with the deodaras flourishing around them.

Of somewhat less antiquity, probably, are the "Twelve Apostles," near Burley Lodge, to the south of Boldre Wood. They have been so named, of course, from their number, though this point of similarity has now passed away. It is difficult to group them, and impossible to find the exact corresponding number. One stands stripped of its bark and bereft of its branches, and will be the next to lessen the traditional twelve. Another of them has still a crown of leaves upon its head, but is hollow from top to bottom. Any one who will go down this vegetable well may see the stars at mid-day, we are told.

While such as these (and there are a few others) represent the extreme antiquity of the forest, there are many thousands standing, scattered or collected in mediæval maturity, never enclosed except by the ban of the fierce old forest law. Plenty of such specimens may be seen if the reader will go leisurely along any of the roads which lead from Lyndhurst, and will occasionally leave the road for the glade, wandering through Barrow's Moor Wood, or Frame Wood, or over Bratley, or following the stream through the great Huntleys. In fact, it is impossible to explore any part of the open forest without a confirmed conviction of the popular mistake as to the scarcity of fine trees in the Old Forest.

The largest single tree in the forest, valuable for its timber, and sound, though perhaps no longer growing, is the Knightwood Oak. Those who are curious in measurement must take a string of 17 to

20 ft. to girth this noble tree, according to the distance from the ground at which they would girdle it, and though there are many larger in circumference in other parts of Hants, yet, taken as a whole, bole and branches together, there will be found few sound trees in the kingdom to match it.

A tree of less fame, but well worth visiting for many reasons, is one that stands near Shepherd's Gutter, or, to associate it with a more poetic landmark, just outside Raven's Nest, on the eastern face. This is a specimen of the Durmast Oak, measuring nearly 13 ft. round at



VIEW IN MARK ASH (p. 236).

5 ft. up ; lofty, and well topped, of an age from three to four centuries. As recently seen by the writer, its foliage was untouched by the devastating caterpillars, though the interlacing boughs of one of the common oaks was devoured by them. A careful inspection directed to this particular enquiry points to the conclusion that the Durmast oak (*Quercus robur sessiliflora*) has this most precious quality, that it is proof against these insects. The whole New Forest at the present time is a spectacle to grieve even the careless eye. Single trees and whole plantations of the *Quercus robur pedunculata* are all but naked of their leaves : the Durmast, in marked contrast, is uninjured.

The term "Durmast" signifies from its derivation "hard mast." The woodmen of the forest know that pigs will reject the acorns of

these trees while they can obtain the others, either from the comparative hardness of the shell or the bitterness of the kernel. Either of these qualities may apply also to the leaf. In passing through some of the plantations in which the two sorts of oak have been intermingled, it is plain to even an untutored eye that the Durmast have the advantage in growth, and this has created a prejudice against them, as if their wood must be softer in proportion to the speed of their increase. But if their more rapid growth be owing to their immunity from the often-recurring plague of these caterpillars, which check the other sort while the Durmast are unharmed, then the truth is that these last do not grow more rapidly, but more regularly than the others, gaining perhaps 10 or 15 years in a century upon them. As to the comparative merits of the wood of the two sorts, a visit to Salisbury Trench, or to the Bentleys, at the present time would assist an observer to form a right judgment on the subject. In Salisbury Trench the quantity of useful timber on the ground is remarkable. Many times the thinning process must be repeated before the residue are left for the lovers of the picturesque, or for landmarks down the stream of Time. In South Bentley there are sticks upon the ground 50 ft. long and a foot through at the top, with an outer rim of sap scarcely thicker in proportion than an orange peel. Both these plantations are of Durmast oak, and both bear all their leafy honours on them. If these remarks should excite in any reader a desire to distinguish between *Quercus robur sessiliflora* and *pedunculata* at a glance, the following distinction is infallible:—the Durmast has a stalk to the leaf, sometimes nearly as long as that of a cherry, and the acorn close down upon the bough, like the fruit of the Spanish chestnut; the other sort has by a strange (I had almost said capricious) peculiarity, a stalk to the acorn, while the leaf rests close upon the bough. There are some other points of distinction, such as the general contour of the tree, the curve of its branches when old, the whiteness and smoothness of its skin when young. But the marks first mentioned are decisive and sufficient.

When tired of the study of the oaks of the forest, from two to nine hundred years old, it may be well to survey the beeches. In Mark Ash there is a block of some two hundred acres, principally of beech. Most of them are giants: many measure from 15 to 20 ft. round, and from 90 to 100 feet high. Every variety of growth and form may be seen among them; and as the lover of forest scenery stands beneath their shade, and looks through the green light of their screening leaves, resting in the silence of the pathless wood, he will see what will more than satisfy him, however ardent be his aspirations for the beautiful.

Two years since the writer had the opportunity of seeing one of

these great beeches on the ground, not felled but wind-fallen; and thus could more easily measure its length—of 30 paces. The space it cleared by its fall seemed like a fresh glade in the forest. The beech, like the oak, is usually firm against the winds; with his wide-spreading roots he lays fast hold upon the ground; and though these vast tops and long branches in Mark Ash must be much exposed to storms, yet there is reason to hope they will be handed down to our children's children in undiminished beauty still.

The first part of our subject shall be closed with this remark, that there is far more real timber in the New Forest than would be surmised by those who judge of it merely from the beaten road and the monotonous moor, or the young plantations. Indeed, there is much standing in the open forest, as for instance in Whitley, which it would be desirable to fell. Time is now adding its waste to the old waste of extravagance and peculation; there are hundreds of trees beginning to decay, which will soon be worthless in the timber-yard, and which if left where they stand have neither size nor features to make them venerable or picturesque. The marking knife should be in the hand of one who would look equally to economy and to beauty—a qualification rare to find, but perhaps not further to seek than in the latest influential appointment, the present occupant of the "Queen's House" at Lyndhurst.

It must be acknowledged that the Office of the Woods and Forests is placed in a most difficult and, indeed, unfair position. The last Act of Parliament which is to control and guide it is most ambiguous. The public are divided by two objects: the cry on one side is for a people's playground; on the other for profitable management. To listen to both must entail the proverbial perplexity. The course which would most likely be the easiest to justify would perhaps be to listen to neither, and to interpret the Act of Parliament as really intending what is best for the future as well as the present.

(b) With diminished space before us we turn now to the young plantations. The term may embrace all those that have not yet been "thrown out;" that is, thrown open to the public and the ponies, the feet of the latter (so think the woodmen) being eventually beneficial to the rooting of the trees; though this is more than counter-balanced by the mischief of their teeth upon the bark. The last removal of fences was in 1851, after an enclosure of thirty-four years. Of what remains still under protection, consisting of nine or ten thousand acres, it is difficult to speak generally and briefly, except in what may seem mere platitudes.

Very successful oak planting may be seen in the course of a walk through Pond-head and Park Ground Enclosure. These are some 350 acres in extent, and are freehold of the Crown.

The popular impression of the planting of the New Forest is that it consists of large blocks of Scotch fir, almost valueless in the end, and formal and sombre to the eye. But in the greater part of these plantations rows of oak stand at certain distances among the firs, deriving much advantage at first from their protection. The latter are thinned out, somewhat too slowly for the good of the young trees they are intended to nurse; and the plea for delay is not merely economy, but the fear of the effect of sudden and complete exposure.

Those who are practically acquainted with the subject know well that the effect of sudden unsparing thinning in plantations does not always correspond with that of a well-hoed turnip field. The entire



VIEW IN FRAME WOOD. (p. 241).

clearance of a wood at once, sometimes ends in desolation; whereas, under the friendly shadow of partial and gradual clearing, "the young heirs," as the woodmen poetically call them, will spring up.

It is generally looked on as a test of soundness in an institution that *it should pay*. There is no objection to this axiom if there may be added to it, "in the end." On this distinction will depend the success or failure of the present management of the forest. If, for the sake of immediate and slight additions to the revenue, the nursing oaks are sacrificed to the Scotch firs, originally planted to shield them and give them an upward direction, the issue will be an irreparable loss for the sake of a momentary gain. In dealing with a forest,

and a national forest too, the cycle of returns should be a distant and a liberal one, commensurate with the longevity of the trees themselves. To dwarf and weaken the young oaks by delaying the removal of the firs among them till the latter have attained to a certain value as pit-props would be an instance of the penny wisdom and pound folly which may be excusable in the straitened economy of an individual, but is not what may be justly looked for in the management of a Government Board. Like a great merchant ship, with its distant voyage and long-delayed profits, but with a safe and precious cargo to be landed at last,—such should be the administration of the forest. They that plant, as well as they that build, should do it for posterity. The derisive question asked of the aged man in Cicero, “For whom are you planting?” may be answered with the old wisdom and piety still, “*pro Diis immortalibus*.”

The modern Evelyn who wanders through the New Forest in search of information, will find there plenty of instances of experimental planting. The three old chestnuts standing outside the venerable wall of the former garden of Boldre Wood Lodge, still so luxuriant in leaf and sound in trunk, seem to have suggested the successful plantation of the same beautiful tree not far from them. Higher up the Douglas fir abounds and flourishes. Draped to the ground, and making luxuriant tops (though these have too often to be renewed after being broken), nothing can be clearer than the evidence they give that they enjoy their situation. The deodaras too are exceptionally good, but have not yet reached an age to justify the hope that they will permanently endure our changeful climate. But whoever delights in these more recent additions to our woods and shrubberies should pass from the open forest into some of the lands formerly alienated from the Crown. No forest law will exclude him now (if he be but governed by the law of civility and self-restraint himself) either from the freehold of the Crown or the sanctuary of private property. In the lovely woods of Minstead he may wander among rhododendrons carrying their blossoms 20 feet above the reach of the hand of man, and *Kalmias* and *azaleas* growing like weeds. In Cuffnals are the finest *cryptomerias* in England, shapely from top to toe, and in Foxlease a specimen of the deciduous cypress which unites the stem of the rapid larch to the foliage of the minutest fern. This tree will grow by the river-side and does not disdain the swamp. It is a wonder that it is not more frequently planted. The one I have referred to must be five and forty feet high, and measures seven feet round.

If a wayfarer may venture so far to sit in judgment as to speak in praise of what he has observed in his walks through the forest, he would venture to say that the present and, indeed, much of the past management deserves high commendation. Attention has been given

to the drainage of the New Forest; this should even be extended. Need there be, out of Ireland, such a bog as Matley, where numbers of ponies, weakened by last winter's severity and starvation, have found an untimely grave, and more than one rider has had a narrow escape of his life? What the Office of Woods and Forests appears to need is the courage of its own opinions and the prosecution of its own designs; more vigour with the axe in the young fir plantations, and among the scattered trees which show signs of incipient decay—excepting those which have the dower of beauty—is greatly to be desired.

In the experimental planting might not a place be found for the balm of Gilead, as well as for the silver fir? The first, pre-eminent in beauty of colour, the last, though continually cut back in spring reaching to a noble height. Witness the avenue at Herriard, in this county. Of the whole mile-long avenue planted when Queen Anne came to the throne "The Hunter's Tree" stands almost alone, a beacon to the belated sportsman for twenty miles around. It is 130 feet high, and girths 13 ft., some distance up the trunk. Such are trees worth planting.

There is another tree which would be a very ornamental variety, suited to the sides of brooks, and no less fit than the common species for gunpowder—the cut-leafed alder. It is as pretty as the common sort is plain.

The improved administration of the forest has now even reached the ponies. Care is taken in choosing better sires; and none but selected ones are permitted to be at large.

We have ventured in an earlier paper to suggest that a forest without its sports loses half its charm: does not the old ambiguity of its name, "the Chace," seem to say as much? It is well for those who love field sports to know that the falconer may again be seen on the wild moors of the New Forest, and that the appropriate heronry is still preserved.

Those who love scenery more than sport can hardly pass in any direction through the forest without an ample reward; single trees, groups of trees, masses of wood, far off and near, meet the eye in endless succession; glades open, with the velvet green of their close-cropped sward,—the golden light stealing through them. In other places the heath, still colourless at mid-summer, is hidden by a mimic forest of fern, green as the larch in spring. But they whose eye seeks for the blue distance and its enchantment should walk over the heights between the Benthleys and Emery Down, and look across all that lies between them and the Southampton Water, with Netley Abbey and Netley Hospital on the other side, tokens of ancient piety and modern charity,—and still beyond in the dim distance to the White Needles, where the Solent becomes the Sea.

Or, if he would people his landscape with the romance of the past, let him look down from Castle Malwood over endless tree-tops stretched before him, and call upon his imagination for the Red King and all his Norman chivalry, as on the day of the fatal chase. He must turn round if he would see the place where Rufus fell—hideously memorialized in iron. Where the stag was that day roused which led the Conqueror's son to his death lay far away towards Lady Cross, amid the oaks of Frame Wood. The king's last chase was of the longest, and, like the Knight of Snowdown, James FitzJames, at close of day—

“The headmost horseman rode alone,”

with no companion by his side, but not without a lurking enemy. Who? Hardly Tirel, who disclaimed the deed when there was no longer reason for a falsehood; perhaps the monks, who hated Rufus while alive; perhaps the brother who gained so greatly by his death.

If the hateful traces of intentional fire—the blackened heath and charred trees which he sees around him in his walk, in more than one direction—should turn the tourist's eye from the present to the past, let him remember that what he has read of the fires lit here by the Conqueror and his son is but legendary. What he sees is sadly true; not the work of royal tyranny revived, but the fruit of wanton, popular mischief, springing from a groundless jealousy; more suited to the red hand of Rufus, or to the severity of Ine's laws for its repression, than to the mistaken impunity of modern times.

A. C. BISHOP.



RUFUS' STONE.

THE AGRICULTURAL DEPRESSION AND HOW TO MEET IT: HINTS FOR LANDLORDS AND TENANT FARMERS.*(Continued from page 77.)*

NOTWITHSTANDING numerous strong assertions to the contrary, there is little doubt that the agricultural depression has been in many counties very much intensified by the practice of breaking up old pastures for the purposes of corn-growing, which was a common custom not many years ago. The extraordinary high price of grain which ruled during the wars of Napoleon I., averaging nearly £5 per quarter, from 1810 to 1814, made a profound impression upon the farmers of the last generation, and land went up to unprecedentedly high figures. Upon the conclusion of peace, corn fell rapidly, and soon sold for much less than the cost of production. The Crimean war, in later times, caused the price of corn again to rise rapidly, and £4 per quarter, in 1855-6, caused much pasture to be broken up, and large breadths to be again sown with cereals. With the close of this war the fall in prices was rapid, and in many instances 35s. per quarter was the highest that could be obtained for wheat.

Mr. J. B. Lawes, in his recent writings upon *Fertility*, says, "There is nothing new in the fact that pasture contains a much larger stock of fertility for the crop to draw upon than arable land. Mr. Caird, for instance, while discussing the possibility of our foreign supply of wheat coming to an end, refers to the stock of fertility existing in our pastures which might be rendered available. It is also further confirmed by the saying that the conversion of pasture into tillage makes a man; and if, as is certainly the case, the accumulation of the lost nitrogen in the soil is necessary to the existence of a pasture, we can readily understand that the converse process of converting arable land into pasture might be said to break a man."

The example and the writings of the late Alderman Mechi, produced followers and imitators in thousands, many of whom have lived bitterly to regret the day when they so hastily adopted the system. But in times of high prices of wheat, and comparative freedom from foreign competition, farmers were only too ready to avail themselves of the opportunities afforded them of pocketing large sums of money by a rapid exhaustion of the soil in corn-growing. Mr. Mechi wrote,— "Grass land is, therefore, a national loss, employing less labour and capital, and affording less profit than it would do if cultivated with roots, green crops, and corn. I apprehend the affection for grass land arises on the part of the landlord, from his being able to obtain a better rent for it than for arable, with fewer repairs and on the part of the tenant, that he is aware it requires less skill and capital than arable land. In the meantime the public welfare suffers much."

A Romney Marsh farmer, of good position and wide experience, was conducting me over his farm last year, and pointing out a large tract of land which he had broken up from pasture for corn and turnip-seed growing, making use of all the appliances which steam and the most improved machinery afforded him; and upon which, at the time of my visit, the laid crop of heavy and discoloured straw and blighted wheat would not pay the expenses of rent and harvesting, to say nothing of other outgoings. After losing large sums of money for some years, he has again attempted to lay the land down to permanent pasture, but this he finds a most difficult task.

As a contrast to the above, I may cite the case of a large flock-master in the Isle of Oxney, who, though most successful in corn and hop-growing, was induced, about fifteen years ago, to lay down the whole of his land to pasture, draining wherever necessary, and selecting his seeds with the greatest care. His success has been extraordinary, as up to the present time he has been fortunate enough to escape the ravages of the sheep-rot. He has not an acre of arable land; he buys all his straw, corn, and cake; and his labour bill is very small indeed. His clear profits might be estimated at £800 per annum, until the very low price of wool told heavily upon his produce. Even now they amount to considerably more than two-thirds of that sum.

These are no fictitious cases, but the results have in both instances been obtained by a close examination of books and accounts which have been regularly and accurately kept—£1,000 a year for the last five years would no more than cover the losses in the first case.

As much of the poorest land in this country, and more particularly the heavy clays, cannot under present circumstances repay the expenses of arable farming, this must either revert to the landlord, or go entirely out of cultivation. If it is to remain in the tenant's hands, it becomes a question of laying down to permanent pasture; and if the landlord takes it in hand, he can only profitably employ it for tree-planting. Both operations, to ensure fair returns, will necessitate large outlays.

In a recent discussion before the London Farmers' Club, which followed the reading of Mr. Evershed's paper on laying down to permanent pasture, various methods were freely discussed. While some advocated sowing amongst corn crops in the spring, others were in favour of a summer's fallow and an early autumn seeding. Mr. Howard recommended a two-years' fallow, a system which may suit the convenience and the pocket of the landlord, but is likely to find small favour in the eyes of the tenant. Sowing grass seeds among sainfoin was also recommended, but this must necessarily be limited to one particular class of soils. I have myself tried various

methods at different seasons of the year, but never had greater success than in sowing with a thin crop of buckwheat in the spring. This affords excellent shelter to the young seeds, repays all the expenses of laying down, and does not impoverish the soil. As buckwheat can be successfully sown up to the middle of May, it affords time for well-working and thoroughly cleaning the land. A field so laid down in the second week of May, 1880, is a complete success, and the experiment will be repeated.

Wherever a permanent pasture is to be formed, it is no unusual thing for the landlord to pay the cost of seeds. Where the tenancy is a yearly one, this should always be the case. It is a custom which, in the interests of both owner and occupier, should be more generally followed. If no corn crop is taken the same year, there cannot be the slightest doubt as to the equity of this. Thus the tenant may obtain the best seeds upon the market, and those only which are suited to his soil. Under existing circumstances, no better investment could be made by an owner who is possessed of a large tract of retentive clay.

The idea of an alternate husbandry, whereby the grass lands were at the end of a few years reduced to tillage, and which had at one time obtained so firm a hold upon the minds of Scotch agriculturists, has long since exploded. The extra weight of produce per acre, and the greater luxuriance of recently sown grasses, were considered to warrant the system. But the attendant and constantly recurring expenses have put an end to it; and in all parts of the country where there is no deficiency of chalk or lime in the soil, or where these substances are within easy reach, and can be occasionally applied as a top-dressing, the natural grasses flourish. As a proof of this we may cite the natural pastures of Ireland, which, throughout nearly the whole of the country, rest upon a limestone bottom, and which are, both for quantity and quality of produce, among the best in Europe. There is no doubt that all old pastures are greatly benefited by dressings of lime and chalk, as these are in all cases found to encourage the growth of the finer grasses. Wherever these substances are very deficient in the soil extraordinary results might be obtained by early spring application of finely powdered sulphate of lime, or gypsum, which should be sown upon grasses and clovers when it will adhere to the leaves and blades. During the last two summers I have taken especial notice of the action of gypsum under such circumstances, and I can record an increase of crop of fully one-third as obtained by an outlay of 6s. per acre upon this substance. Its effects upon peas, tares, and nearly all leguminous crops may be described as marvellous.

With the prospect of continued and even increased foreign com-

petition in corn-growing, the farmer's mainstay must be his pastures and his general forage and root crops. But even in cases where the arable land is well farmed, it is no unusual thing to see the pastures much neglected and becoming mossy. Bush harrowing and heavy dragging are especially valuable upon mossy lands, and alternate mowing and grazing are to be recommended. Where they are constantly grazed the irregular droppings of the animals depastured upon them encourage the growth of tufts of coarse grass. This may to some extent be remedied by close grazing with sheep.

As an illustration of the value of old pasture, a well-authenticated report speaks of some parts of the Lincolnshire marshes as carrying and feeding fourteen bullocks to the thirteen acres, besides grazing thirty-five sheep the year through; and twenty-one acres had during a series of years kept nineteen heavy oxen and one hundred sheep, from Lady-day to Michaelmas.

A study of the qualities of the soil, and the habits of the natural grasses adapted to it, will enable any one to lay down with a fair prospect of success, supposing the land has not been thoroughly exhausted by over-cropping. Thus it will be found that sandy soils generally abound in the fescues—sheep's fescue, smooth and hard, crested dogstail, oat-like soft grass, meadow and smooth-stalked soft grass. Upon calcareous soils are found rough cocksfoot, white clover, sheep's fescue, perennial rye, ribgrass, yellow oat, and sweet-scented vernal. Peaty soils, also, often abound in the latter, as well in meadow foxtail and meadow soft grass, rough cocksfoot, meadow catstail, crested dogstail, and creeping bent grass. Upon fens are found the creeping bent, water-hair grass, reed-meadow grass, and most of the true aquatics. Upon the argillaceous soils we generally find meadow foxtail and catstail. Timothy grass, cocksfoot, meadow fescue, ribgrass, yellow oat, sweet-scented vernal, perennial rye, and yarrow.

The success of a newly-formed pasture must depend very largely upon the adaptation of the seeds to the soil. Mixtures of seeds, also, will grow much closer together, and produce a far better sward than one or two kinds only. In laying down it is almost useless to apply manures and plough these in deep, as is sometimes done. A succession of top-dressings will do much more good. In sowing with corn, barley is said to be better suited to the seeds than oats, as it more thoroughly loosens the texture of the soil. But upon lands in high condition the barley is apt to become lodged, and thus destroy the seeds; and if the latter happen to grow very strong, the time taken to harvest the barley crop often exposes the grain to wet weather, thus injuring its colour and lessening its market value.

Undoubtedly one of the greatest helps to the British farmer, under existing conditions of the corn trade and the labour market, will be

found in the formation of permanent pasture, which will enable him to keep more stock in summer and very largely to reduce his labour bill. And his success in laying down will be proportioned to the cleanness and fertility of the land and the adaptation of seeds to the soil and climate. It is well known that some of the deep rich clays produce the finest pastures in the kingdom. The accumulations of vegetable matters from the decaying roots go on, year after year, and these are largely increased by top-dressings and by feeding off upon the pastures corn, cake, and root-crops. If the land is fairly light and loamy, and at the same time rich in vegetable matters, a good sward is soon established. And though stiff clays, owing to the absence of vegetable matters, take a much longer time to stock, they produce in the end the most valuable pastures.

Draining, cleaning, and levelling before laying down, with a firm bottom and fine surface, are indispensable requisites to complete success. It is also absolutely necessary that the seeds be only lightly covered, just sufficient to ensure germination. Where the land is, at the time of sowing, either very rough or too loose, the success is seldom great.

One principal cause of failures in laying down is the neglect of a proper adaptation of seeds to the soil. But a study of the natural grasses upon any particular classes of soils will enable any one to select with a tolerable certainty of success. As a mixture adapted to a wide range of soils, I can confidently recommend the following:—

Meadow fescue, red fescue, darnel-leaved fescue, Timothy, perennial red,	lbs.
and smooth-stalked meadow, 1 lb. of each	6
Meadow foxtail, sweet-scented vernal, crested dogtail, sheep's fescue,	
rough-stalked meadow, alsike, 2 lbs. of each	12
Round cocksfoot, hard fescue, perennial ray, yellow trefoil, 3 lbs. of each	12
Evergreen rye, Pacey's rye, and perennial white, 4 lbs. of each	12

Total.....lbs. 42

This is well suited to medium soils, and it may be added to or deducted from as the land is heavy or light.

A principal consideration in laying down to grass should be the production of a continuous supply of herbage for the longest possible period, as well as obtaining the greatest amount of nutritive matter. Thus, for early produce, we may take sweet-scented vernal, sweet soft-grass, annual meadow, meadow foxtail, and soft brome-grass; but most of these are deficient in nutritive matter. Next in time come smooth-stalked meadow, sheep's fescue, rough-stalked meadow, hard and darnel-like fescues, and quaking-grass. After these, in point of time and increase of nutrition, come cocksfoot, meadow fescue, perennial rye, tall oat-like soft-grass, and upright brome-grass.

And later in the season, but still more valuable, crested dogstail, catstail, woolly soft-grass, yellow oat, woodmeadow-grass, meadow catstail, many-flowered brome, and some others. A mixture of the above kinds would, therefore, ensure a constant succession, increasing in value as the season advanced. Early shooting and late flowering grasses are the most valuable.

Those who carefully examine old, rich pastures will not scruple to put plenty of seed upon the land, for, where the variety is great, six or seven distinct plants may be found upon every square inch of surface.

Many newly-formed pastures are ruined by grazing them too closely with sheep. These bite out the very heart of the finest herbage, so that the stronger grasses soon gain complete possession of the land. When grazed with cattle (a course which should invariably be adopted for the first year or two), a scythe should sometimes be sent over the land to take off the tufts of rough grass. Wherever the plants come up weakly, a dressing of about $1\frac{1}{2}$ cwt. of nitrate of soda, or 3 cwt. of genuine Peruvian guano, per acre, will stimulate the growth. But a good compost regularly spread and well brushed in will produce more lasting benefit. If this consists of one portion of lime to four of rich loam, a luxuriant growth may be looked for.

B.

(To be continued.)



WHAT IS TO BE DONE WITH LAND?

No. 3.

(Continued from page 194.)

FIXITY of tenure is a recently coined term, which gives more the idea of immovability than is warranted by its present application, and the alarm on this head in the Irish Land Bill is needless when it is said that the landowner is parting with the ownership of the land. If fixity of tenure is conceded, to a certain extent all owners who let their land part with their rights over it more or less, and it is for the landowners of England to consider what they will concede in the shape of fixity of tenure, which is no new thing, and is in existence as copyhold, lifehold, leasehold, leases for years, and also implied in that feeling of unwillingness on the part of the majority of landowners to get rid of an old tenant; indeed, without fixity of tenure, expressed or implied, land would never have been brought into cultivation, and the question now is, *can it be kept* in cultivation without it? I think not. It may be as well to observe that the great majority of tenants will not spend a shilling on the most

necessary repairs; not a brick nor a stick will be touched without a guarantee that they are to be recouped, and they cannot be blamed.

A lease of not less than 21 nor more than 25 years would be a sufficient length for any tenant; on the other hand I do not advocate what are called "liberal covenants;" for, as the landlord has parted with the right over the land for a period of time, the tenant should be bound by *strict* covenants as to cropping, keeping stock, and repairs. It is hardly probable that the last quarter of the century will witness the introduction of any new plant suitable for field cultivation. However, there are few landlords who, if a mistake has been committed in the first instance, but would see the advantage of correcting it. For many reasons, however, it is better for a tenant to know what he has to do and what he must not do under an agreement, which should be particular and distinct in the wording of the covenants, and should not have the general clause, "according to the custom of the country," inserted. It would be presumption on my part to give even the sketch of a model lease, much more so an English Land Bill, which there is little doubt is looming in the near future. On the small holdings spade husbandry would be advisable, and the raising of fruit and vegetables, pigs and poultry, milk and butter, should be prominent. These are comparatively small things, but I am afraid the day of small things has been despised, and too much attention is paid to producing things on a large scale: the Scotch proverb, "ilk little mak's a muckle," comes home with peculiar force to farming at the present time.

The qualifications necessary to a farmer are many and varied, the principal ones being intuitive; nor can they be acquired by length of study: and without going so far as to say that it is a "gambling with the weather," still a forecast of the changes of the weather is a knowledge essential to the farmer. Again, to be a judge of stock is an absolute necessity, and this seems an instinct in some men, and which no teaching will impart; but without it a farmer is at the mercy of middlemen, who of course must share the profits. A knowledge of the adaptability of soils for certain crops: this can readily be acquired, as experience has now recorded all such information. Then, again, the manure to be applied, and here experience has proved that farm-yard manure is the best for all land in the long run; indeed, a mistake cannot be committed in this, and, if possible, all artificial manures and foods should be avoided, as the money paid for these is such as no farm can bear.

It would be useless to ignore the probability that the creation of small holdings might lead to some of them falling into the hands of a man who is either a bad neighbour, husband or father, or a bad farmer.

For this last we could have the remedy of *strict* covenants, for the

others there could be no remedy but care in the first selection; still it is just possible that with every care such a thing might happen, and it is the only serious objection to the proposal, for what could be more annoying to the other tenants, as well as to the owner, than to have such a man with fixity of tenure?

I have now given the answers to my question of "What is to be done with land?" namely, a "produce rental," "smaller holdings," and "fixity of tenure," and I shall conclude with an extract from an article in the *Contemporary Review*, on the prospects of landowners, by Professor Aldis, who sums up in these words: "It is not impossible that our own time may see a great reduction in the value attached to the mere possession of land, except by persons who are intending to gain a living by personal work in its cultivation. It is not to be supposed that any large portion of English soil will be allowed permanently to remain uncultivated, even if circumstances will not allow it to pay rent. The owners of such land will have to cultivate it for their own profit, either personally or by means of stewards, and will exchange the position of mere rent-receiving landlords for that of farmers. Among other changes that may be looked for will be the gradual creation afresh of a number of peasant or at least small proprietors, for such proprietors will be able to cultivate so as to support themselves, where it would be quite absurd to attempt to cultivate for mere commercial profit."

JOHN SMITH.

REMARKABLE TREES ON ALTIRE ESTATE,
NEAR FORRES.

HAVING recently paid a somewhat hurried visit to the woods on the Altyre Estate, through the courtesy of the wood-manager I am enabled to give an accurate statement of those trees most worthy of note.

The first of these are two splendid specimens of the common larch, growing side by side on the banks of the Findhorn River.

No. 1 larch measures as follows:—Girth at 1 ft. from the ground, 14 ft., at 5 ft. up, 10 ft. 4 in., and contains over 190 cubic ft. of timber.

No. 2 larch measures:—Girth at 1 ft. from ground, 9 ft. 3 in.; at 5 ft. from ground, 7 ft. 9 in., measures to about 70 ft. in length and contains 138 cubic ft. of wood.

No. 3 is another splendid specimen of a larch, growing also on the bank of the Findhorn, but which can only be viewed from the

terrace, some 30 or 40 ft. above it, which robs it of the striking appearance that marks the two former. Its quarter girth, at 35 ft. up, is 1 ft. 5 in., and it contains 140 cubic ft. of timber.

No. 4 is a majestic specimen of the common British oak (*Quercus pedunculata*), situated also on the margin of the Findhorn, but having been planted without due consideration as to situation it might be passed, within a short distance, unobserved unless attention were specially directed to it. Nor have the blasts of by-gone years left it unimpaired, as will be seen by its broken branches and denuded limbs, which give it a romantic and rugged outline. It girths, at 1 ft. up, 16 ft. 7 in., at 5 ft. up, 13 ft. 3 in., and has a spread of branches of something over 100 ft.

No. 5 is a most splendid and characteristic specimen of the Silver fir (*Picea pectinata*), girthing at 1 ft. up, 18 ft. 8 in., at 5 ft. up, 18 ft. 2 in.; quarter girth at 21 ft. up, 2 ft. 10 in. and contains 387 cubic ft. of timber.

Many of the *native* Scots fir on this estate have attained to remarkable dimensions, and the few that I had the opportunity of measuring contained from 106 to 112 cubic ft.

The soil on this estate seems well adapted for most of the newer coniferæ, as the healthy appearance of the judiciously arranged pinetum bears testimony. Amongst the noteworthy of the coniferæ, I observed a graceful specimen of Prince Albert's spruce (*Abies Albertiana*), grown as a lawn decorative tree, its graceful, drooping branches and neat pyramidal outline rendering it highly attractive; it has attained to a height of 42 ft., and girths 3 ft. 5 in.

A very promising specimen of *Wellingtonia gigantea* has attained to a height of 36 ft., and girths 6 ft. 5 in.

"TOURIST."

SURFACE DRAINING.

(Continued from page 187.)

DRAINING is a work that can well be done by contract, and more conveniently and economically than most other kinds of work, and it should always be so done when it can be effected. For ordinary purposes drains answer well put on at 20 ft. apart, 30 in. wide at top, 10 in. wide at bottom, and 20 in. deep. In contracting for an extensive number of drains, where a diversity of soils exists, and mossy parts have to be drained as well, it is most convenient to specify the drains in the mossy ground to be 36 in. wide at top and 2 ft. deep. By thus specifying the moss drains to be larger every way, two advantages are thereby gained: the one is that the moss

ground, which always greatly subsides when the water is extracted from it, receives the benefit of the extra size of drains, which in consequence of subsiding, it so far requires; and the other is, that on measuring the drains, the price being the same throughout, it is not necessary to keep the two classes separate, being all let at one price. Moss ground unless very full of old roots, from which old moss ground is seldom altogether exempt, can therefore be done at a cheaper rate than clay soils, thus allowing a greater size of drain to be cut at the same price.

One precaution, as already set forth in the preliminary part, is specially necessary to be observed in laying off plantation drains, viz., not to give them too much fall; there is more injury done to plantation drains by want of attention to this than all other matters connected with it. The result not only is that the soil on the sides of the drains falls in, carrying trees with it, and destroying the surface of the ground on both sides, but the soil is also carried down and deposited in places where it does a great amount of injury. The drains should only have sufficient fall to enable them to discharge the water which they contain, which 2 ft. in 100 yds. will enable them sufficiently to do. Too much water should not at any place be conducted into one drain, for in duly drained ground it runs off so rapidly that unless it is well divided into small streams, serious results soon follow, and it not unfrequently happens that after the whole drainage of a piece of moorland has been completed, the water-runs have to be further subdivided than was at first contemplated, in order to avoid this evil.

A difficulty of an opposite extreme is sometimes to contend with in the levelness of the ground and excessive wetness combined. In such cases the most practicable thing to do is to lay the ground up in narrow ridges, and by means of the excavations thus taken out of the drains, the ground can be raised say 2 or 3 ft. above the water level. The ditch or channel must be made of such dimensions as to afford the requisite quantity of earth to raise the ground as above indicated. The ridges should not be broad, seldom exceeding 20 ft., and 12 ft. is sometimes even more suitable. All, however, in such undertakings must be guided by local circumstances, which can only be determined upon on the ground.

The fall required for open drains is considerably more than that for underground tile drains. If open drains require 2 ft. in the 100 yards, underground drains will do well enough with only 1 ft. It is well in all draining operations to work systematically and make free and constant use of the level. There are now so many forms of levels that it is, perhaps, best to let each make choice of their own. I occasionally make use of any one of three kinds, and all are useful, and do their work well. One is the common mason's spirit level,

with a brass frame to fit into the head of a pole about 5 ft. long, and shod for going into the ground, or a strong walking staff with a gimlet hole will do almost as well. This instrument, with brass frame, costs about 20s. Another, and comparatively new invention, is a levelling hand instrument, which is simply held in the hand, and indicates the level quite correctly; it is very small and light for the pocket, needs no stand, and does well for general moorland drainage laying off; it also costs about 20s. The last I refer to is that commonly used by surveyors. The instruments are three in number, but one in use or application, and are called the Y level, Troughton's level, and Gravat's level. I generally use and prefer the latter, but they are all equally good. They are, however, rather expensive, the selling prices being respectively for the Y level, £13; Troughton's do., £13; and Gravat's, £12. But probably they can often be bought for less money.

It is all the more necessary to make use of the levelling instrument from the circumstance that the eye is very apt to be deceived respecting falls and inclinations of the ground.

On draining ground that has much fall upon it, it is better to make the pipes curved and winding if they extend up hill, but if horizontal to the hill they may be laid on across, and in parallel straight lines.

Drains 30 in. wide and 20 in. deep, as before described, usually cost from about 7s. 6d. to 8s. 6d. per 100 yards, which includes spreading the excavations; if the ground is of nearly uniform level on both sides it is spread on each side alike, but if the ground slopes, the excavations should be spread on the lower side, to allow the water to fall more readily into the drains, and prevent the excavations from crumbling or being washed into them.

Drains on the same ground 3 ft. wide, 2 ft. deep, will cost about 12s. per 100 yards. For convenience in draining the following table may be referred to, which often saves calculations when there is not much time to make them:—

YARDS OF DRAINS TO THE IMPERIAL ACRE.

At 10 ft. apart	1,452 yards	At 21 ft. apart	691½ yards
11 "	1,320 "	22 "	660 "
12 "	1,210 "	23 "	632 "
13 "	1,117 "	24 "	605 "
14 "	1,037 "	25 "	581 "
15 "	968 "	26 "	559 "
16 "	908 "	27 "	537½ "
17 "	855 "	28 "	519 "
18 "	806½ "	29 "	501 "
19 "	765 "	30 "	484 "
20 "	726 "		

It is so often found necessary to put in tiles, soles, &c., into plantation drains, that I feel justified in giving the price list as at this date.

PRICE LIST AT TOCHINREAL TILE WORKS, NEAR CULLEN, BANFFSHIRE.

		s.	d.
Drain pipes, 2 in. bore, 14 in. in length		29	0 per 1,000
Do. 2½ „ do. „		39	0 „
Do. 3 „ do. „		50	0 „
Do. 4 „ do. „		75	0 „
Do. 6 „ do. „		175	0 „
Do. 8 „ do. „		0	9 each
Do. 10 „ do. „		1	2 „
Do. 12 „ do. „		1	6 „
Do. 14 „ do. „		1	10 „

Segment Tiles for 12 in. drain..... 1s. 3d. per yard.

Do. do. 18 in. do. 2s. 0d. „

Feet apart	Tiles required	Feet apart	Tiles required
10	3,734	21	1,780
11	3,395	22	1,698
12	3,112	23	1,626
13	2,873	24	1,556
14	2,667	25	1,494
15	2,490	26	1,438
16	2,335	27	1,384
17	2,199	28	1,335
18	2,075	29	1,289
19	1,953	30	1,245
20	1,867		

Drainage work is now from 10 to 15 per cent. cheaper than it was three years ago. The present prices for 3½ ft. drains, in Banffshire, including cutting, laying tiles and filling in, 13s. to 17s., according to soil, &c., and 4 ft. leader drains from 1s. to 2s. more per 100 yards.

At one time it was thought that the plough could be made to accomplish much of the requisite surface drainage of the hill districts, such as sheep pasture and ground for planting, and thereby cheapen the expense of such work, and save manual labour, and for that purpose an excellent implement was made by Mr. McEwan, and described by James Smith, Esq., Deanston, in a pamphlet published by W. Drummond & Sons, Stirling, in 1844, who speaks of it as follows:—

“Thorough draining having now become in this country a most important process in the labour of the agriculturist, any means of expediting its execution, and diminishing its cost, must be considered one of the greatest boons that can be bestowed upon the farmer.

“Since the first introduction of the system of frequent draining, a yearly progress has been made in improved execution and lowered cost, and in most districts where it has been practised a class of excellent workmen has been created; so that comparatively with the earlier years, the work does not now cost one-half of what it did.

Still the expense is considerable, and any material reduction in cost will tend much to extend the application of this powerful arm of cultivation.

“Various attempts have been made by enterprising and ingenious individuals to apply the principle of the plough in cutting drains, and, in some cases, considerable success has attended those attempts. In most cases, however, the design has been on too limited a view, and the construction of the implement too slight and contracted to admit of complete success. There is one error most fatal to successful invention, into which, unfortunately, most inexperienced inventors fall. It is an attempt to make an implement adjustable to too many purposes. When an implement is made to apply to one purpose only there is full scope left for its complete adaptation to that purpose; and it must be a very expensive implement, and of very limited use, if it will not pay to be made for one purpose alone.

“The surface and subsoils of this country are so various in their nature, that it is no easy task to design a drain plough applicable to many of them, and almost impossible to get such to apply to all. There is the *carse* or soft clay, the indurated clay of the higher districts, and the stony earth and *moor-band*, forming by far the greatest extent of arable land in Scotland, perhaps in Britain. In the softer clays the application of the plough is most easy, as they repose in a uniform and free mass, with no stones; in the upland clays there is in general a firm and stubborn mass, and in many instances a pretty frequent mixture of stone, of various sizes, from the large whin boulder to stones the size of a hen's egg. The earthy subsoils of the uplands are generally full of small stones, with an occasional boulder, and in both cases picking is necessary in cutting drains. In these, therefore, the inventor of the draining plough finds his greatest difficulties. The softer clay is certainly the best field for first experiments, and having there found the proper form of implement and mode of application, an attempt may be made upon the more obdurate materials.

“Mr. Peter McEwan, tenant in Blackdub of Blairdrummond, near Stirling, turned his attention to this subject some years ago, and by the most unconquerable perseverance, and with much ingenuity, he has wrought out an implement, which, in his own carse lands, effects the opening of drains to a depth of from 18 to 22 inches, in the most perfect manner, and at the small cost of about 2d. per rood of 36 yards.

“The application of this instrument in the higher grounds, in the more firm and strong subsoils, has not yet been fully proved; and some experience and modification of form may be necessary to establish its successful application in the carse, there can be no doubt that with a sufficiently massive and strong implement, drawn by a

powerful team of horses, the work may be accomplished in most situations.

"The leading principles of the construction of Mr. McEwan's draining plough are :—Having it of such large dimensions as to turn out at once the full depth of the drain, which is the more easily accomplished by having the furrow of a wedge shape, and ample in its width, so that when separated from the soil it shall lift freely out. Having the mould-board or inclined plane of the plough of great length, and consequently of easy slope, so that the great and weighty furrow shall be gradually raised, whilst by the same form the plough is rendered more steady and easy to hold. The furrow is taken clear out and laid along the drain at about one foot distant from the margin. From eight to twelve horses are necessary to work this plough in carse land according to the nature of the soil, and it is probable that sixteen may be necessary in some obdurate clays. The pace of the horses must be slow—say two miles an hour, and the plough is easily directed by one man. After the plough has done its work, men follow with small spades, to take out a space for tiles or for broken stones, and to correct any deviation from the uniform fall of the bottom, caused by any unevenness of the ground. The tiles or stones are then put in, and the furrow turned in over them by the same plough, somewhat altered, as will afterwards be described.

"The cost of the plough work in opening the drain, taking twelve horses as a medium number, will run thus :—

12 horses at 4s. per day	£2 8 0
8 men at 2s. per day	0 16 0
To cover interest of cost, and wear and tear of plough, say 1s. per hour	0 8 0
	<hr/>
	£3 12 0

"If the horses were to move continually at a rate of two miles per hour, they would turn out 782 roods of 36 yards in eight hours ; but in so heavy an operation, much time is lost in turnings and otherwise, so that one-third may be deducted to cover loss of time, which will leave 521 roods of work done, which at the above cost, will come to 1½d. per rood ; but say 2d. per rood of 36 yards, which will cover the expense of ploughing in also.

"The horses go on each side of the line of drain, the near horse of the off-side division going in the furrow, all being yoked to a strong main bar, or master tree, 10 ft. long, and arranged in fours or sixes abreast, as may be necessary—four abreast when eight horses are used, and six when twelve are used. The leading horses draw from a second mainbar attached to the muzzle by a chain passing along betwixt the middle horses behind. When the plough reaches the end of a line of drain, and is about to be turned, the draught chain of the leading horse is

detached, and a man taking hold of the chain, the bar resting on the ground, follows round till in a position to be yoked for the next line of drain, the plough following, drawn by the rear horses. When working, each pair of horses is led by a man—one man to each range of horses—going in the middle, and leading a horse in each hand, and a man going on each flank leading the two horses next him; the steadiest man being put in the middle, to keep a direct line for the drain. The man who lifts the chain assists the ploughman in raising the plough from the drain just completed, and in going round and entering for the next drain. When the plough is to be applied in turning in the furrow, the double-feathered sock with the spur coulter is removed, and a plain common single-feathered sock put in its place. To the back of the mould-board a piece of board is attached, for filling up the vacant space from the lower edge of the mould-board to the ground. At this work the plough is drawn either by three or five horses, as the land may require, pulling from a main bar or master tree 13 ft. long. When three horses are used, two are yoked to the end of the bar crossing the furrow which has been laid out, and one to the opposite end of the bar, on the other side of the drain, the bar being attached to the muzzle of the plough at one-third of its length from the point at which the two horses draw. When five horses are used, three go on the furrow side of the drain and two on the other. One man is required to hold the plough, and a man on each side of the drain to guide the horses. The pace of going may be equal to that in common ploughing.

“The drain plough, like all things else of the same magnitude, and when in the hands of inexperienced persons, requires great patience and perseverance, especially when applied in land of a hard and stony nature, and can never succeed in the hands of impatient and careless people. But to those who take time and pains to have their men and horses fully broken in to the work, there will be an ample reward in the cheapness and expedition with which the drains shall be executed.

“These ploughs are made of two sizes, one weighing about 5 cwt., costing about £11; and the other, weighing about 4 cwt., costing about £8 8s.

“The draught bars, or swing trees, necessary to accompany each plough, are two 6-horse trees, four 3-horse trees, and a strong chain, costing altogether about £4 4s.

“The ploughs, draught bars, and chains are furnished to order by Messrs. W. Drummond & Sons, Stirling.”

Of Mr. McEwan's drain plough there have been several made, two of which have been applied by intelligent practical farmers in the harder subsoils of the higher country. The following extracts will show that it promises to answer well in such land :—

(Copy.)

From Mr. Drew, Farmer, Carmyle, near Glasgow, to Mr. Mc Ewan, Blackdub, near Stirling.

"Carmyle, 1st January, 1838.

"DEAR SIR,—In regard to the drain plough, she is admirably constructed, and every part is well proportioned for twelve horses, so that there can be little alteration made. The soil that we had to work upon last year was a close, stony, retentive clay. After going down 8 in. it had all to be mattocked, and it was wonderful how the drain plough turned out such stuff, about 17 in. deep. We did not yoke more than ten horses. The field being steep, we brought the drains all down the hill.

"Yours, &c.

(Signed)

"LAURENCE DREW."

(Copy).

"Mr. John Glen, Farm Overseer, Hilton, near Alloa, to Messrs. Drummond & Sons, Stirling.

"Hilton, 25th January, 1838.

"DEAR SIRS,—We have used Mr. McEwan's drain plough for the last four months, and have drained 8,037 chains, Scotch measure, with it. Our land is hilly, and mostly composed of clay and small stones, and some parts of it sand and gravel. I find six horses enough for our land, and we lift from 15 to 17 inches. We do it all down hill, and up empty. In this way we drain 400 Scotch chains in nine hours, the width at top of drain 18½, in bottom 8 in., and all is sufficiently done. We find it to be a great saving.

"Yours, &c.,

(Signed)

"JOHN GLEN."

To some it may be interesting to know that the Romans, who were praiseworthy in their efforts at husbandry, were even in their day not so far behind, either in their knowledge or practice of draining, as the following quotations will exemplify:—

"The Romans were at very great pains in draining their wet lands. Cato represents this as a matter of very great consequence: 'In the winter,' he says, 'it is necessary that the water be let off from the fields. On a declivity, it is necessary to have many drains. When the first of the autumn is rainy, then is the greatest danger from water; when it begins to rain, the whole servants ought to go out with sables, and other iron tools, open the drains, turn the water into its channels, and take care of the cornfields, that it flow from them. When it rains, it is necessary to go round all parts of the villa, and to mark with charcoal the places where the rain goes through, that so, when it turns fair, the tiles may be changed. Whenever the water stagnates amongst the growing corn, or in other parts of the cornfields, or in the ditches, or when there is anything that obstructs its passage, that should be removed, the ditches opened and the water let away.'

“ Varro recommends draining as a work to be performed betwixt the winter solstice and the coming of the zephyrs, which was reckoned about the sixth day of February. ‘In the eighth interval,’ says he, ‘betwixt the winter solstice and the coming of Favonius, these things ought to be done. If there is any water on the cornfields, it ought to be let off.’

“For the purpose of draining, Columella recommends ‘that immediately after the seed is sown, water-furrows be drawn, and this though the season is dry and the seed early sown.’ The same author, in his calendar, recommends ‘that in that season the ditches be cleaned, and water-furrows made.’ Pliny tells us that it was the custom to make wide furrows where it was necessary for conveying the water into ditches or drains; and that this work must be performed, as Varro directs, betwixt the winter solstice and the coming of the zephyrs. Virgil likewise recommends care in conveying away the water, especially in the rainy months, when rivers overflow their banks, and leave their waters in the hollows.”

The representation which I have given of the care of the Roman farmers in draining and keeping their lands dry, in such soils, and in such a climate as Italy, may be considered as a severe reproof to many of the farmers in Britain, where the land is stiff and the climate wet. There is scarcely anything of greater importance in farming than preventing land from being hurt by water. It is particularly of importance to lay it up in such a manner before winter as to keep it dry, that if sown, the young plants may not be chilled, and if not sown, it may be in a proper condition for being ploughed in spring.

The Romans were by no means negligent; they not only observed the importance of draining, but they also carefully determined the places and position of their drains, and adapted the kind of drain to the situation of the field. There are two kinds of drains in use in Britain; the one kind is open, the other is covered. Open drains are easily made, but more care and attention are required in making covered ones. The way of making these, and the manner of applying them, we have from the Romans, who used both kinds. A particular description of them is given by almost all the rustic writers. Cato, the oldest writer, directs covered drains to be made in this manner. Treating of the culture of olives, he says, “If the place is wet, it is necessary that the drains be made shelving, 3 ft. broad at the top, 4 ft. deep, and 1½ ft. wide at the bottom. Lay them in the bottom with stones. If there are no stones to be got, lay them with green willow rods placed contrary ways; if rods cannot be got, tie twigs together.” Columella describes both the kinds of drains in these words: “If the land is wet, the too great abundance of moisture may

be dried up by drains. Of these we know two kinds, covered and open. In stiff and clay soils they are left open, but where the soil is of a looser nature, there are some open; but likewise some are covered, placed so that the mouths of the covered drains may let the water pass into the open ones. But it is proper to make both the open and covered drains shelving, broad at the top, and narrow at the bottom, like roof tiles turned upside down, for those whose sides are perpendicular are soon damaged by the water, and are filled with the falling of the earth from the top. Again, the covered drains are to be made 3 ft. deep, half filled with small stones or clean gravel, and the earth that was dug out thrown over them. If there are no stones nor gravel, let twigs be twisted like a rope, and formed to the exact thickness that the bottom of the narrow ditch requires, so as to take it in fitted and pressed into it. When this is stretched along the bottom, let cypress or pine, or, if there are none of these, any other leaves, be pressed upon it, and then covered with earth. At both ends, however, after the manner of little bridges, two stones should be placed, by way of pillars, and one laid on the top of them to support the bank, lest the earth should be carried away by the falling down and issuing out of the water." Pliny expresses himself on this subject in this manner: "It is very advantageous to cut and dry wet land by drains. These ought to be left open in clay soils. In looser soils they ought to be strengthened with hedges, or they ought to shelve downward, to prevent them from falling in. Some of them ought to be covered, and drawn into others larger and more open. If there is occasion, they may be laid in the bottom with flint or gravel. Their mouths on each side ought to be supported by two stones, with one laid over them." Palladius says: "If the land is wet, it may be dried by drains drawn from every part. Open drains are well known; covered drains are made in this manner. Ditches are made across the field 3 ft. deep; afterwards they are filled half-way up with small stones or gravel, and then filled to the surface with the earth that was thrown out. These covered drains are let into an open one to which they descend, so that the water is carried off, and destroys no part of the field. If stones cannot be got, branches, or straw, or any kind of twigs, may be used in their place."

The Romans used always open drains in their stiff soils, and though in the very loose soils they had some covered drains, yet they had likewise open ones for receiving the water from these. In stiff soils, water cannot find its way into covered drains, except the water of springs whose channels are intercepted by them; but in free, loose soils, that have a hard bottom that resists the water, covered drains, properly placed, may be very useful, provided there are open ones for

carrying off the water. Palladius informs us that those drains were placed across, and this would be very proper for intercepting the water in its way. All of them were made to shelve as our ditches do, and when the soil was very loose, and the drains open, Pliny says they were sometimes formed with hedges, the roots of which would prevent, in some measure, the earth from falling down from the sides into the bottom. The covered drains, when designed to convey the water from the pits made for olive trees, were made, according to Cato, 4 ft. deep. When made 4 ft. deep, they were 3 ft. wide at the top, and $1\frac{1}{4}$ ft. wide at the bottom. When made 3 ft. deep, it is probable that they were wide at the top, and shelved in the same proportion. They were filled half-way up with small stones and gravel; if none of these could be got, with willow poles; if none of these, with twigs twisted, or even with straw. Above these they were filled with earth, so that the earth was $1\frac{1}{4}$ ft. deep, far enough below the reach of the plough. Both ends of these drains were fortified with little stone bridges, a stone on each side for pillars, and one laid over for the top. From these drains having small bridges at both ends, and being placed so as to convey their water into open drains, it appears that they were designed for intercepting the water of springs, and conveying it from the field, for Columella supposes that the water runs into them as well as runs out, with some degree of violence, which is the case only with springs. Experience teaches us that it is only in this kind of wet land that these drains are useful.

From all these things, it is evident that the Romans were very careful in draining their lands, and very exact in making and placing their drains; and whoever compares their practices in these matters with ours in modern times, will be convinced that we have made but little improvements, and that in very few places, if in any, we have arrived at their care and exactness.

C. Y. MICHIE.

THE BEECH AND THE HORNBEAM.

NATURAL ORDER:—*Corylaceæ*.

THE BEECH (*Fagus sylvatica*):—This is one of the largest of our timber trees, and if it is not considered to be also one of the most picturesque, this is due rather to its closeness or compactness of growth than to the absence of distinct attractive features. Its large and smooth-barked stem is sometimes of a silvery colour, often fluted, and marked with patches of lichens and mosses of a rich golden hue. The foliage is dense and somewhat silky in appearance. The leaves may be described as ovate and obsoletely serrated. A young and

free-growing beech tree often presents an appearance of considerable gracefulness. These trees are also very effective among oaks in the autumn season.

Beech is found in abundance in the southern counties of England and upon chalk and limestone soils throughout the country generally. When planted pretty close together, so as to draw each other up, these trees sometimes attain heights of upwards of 100 ft. Their general height under favourable circumstances is from 70 to 80 ft., with a diameter of from 4 to 6 ft. The beech is a native of Europe and of the southern parts of Russia. It grows well in a strong clay with flints, as in some parts of Herts. It also follows the line of chalk hills which stretches from Dorset through Wilts, Hants, Surrey, Sussex, and Kent, branching out into Berks and Bucks. It is also grown extensively on the banks of the Wye, in Herefordshire and Monmouthshire, where it is much used for charcoal burning; and upon the Cotswold and Stroudwater hills in Gloucestershire.

A celebrated beech of Chantilly, described by Arthur Young, as between 80 and 90 ft. high, was very straight in its growth, rose 40 ft. to the first branch, and was 12 ft. in circumference, at 5 ft. from the ground. Pontey, also, describes and figures the celebrated "Woburn Beech," which rose 50 ft. to its branches, straight as an arrow, without either a flat or a furrow," and was considered by him to be a model of what a good method of training timber should produce.

Beech timber is applied to a variety of uses. It was at one time much in request for the keels of vessels, as it stood well under water, and also for piles and sluices. It is also in request for chair-making in Bucks, and for bedsteads, carpenters' tools, and large malt and granary shovels in other places. It is sought for by turners, joiners, and toy manufacturers; is occasionally used for railway sleepers, gun-stocks, wheel and cog making, dockyard wedges, mallets, planes, carriage panels, sounding-boards to musical instruments, and for the manufacture of gunpowder. The smaller branches are used for smoking haddocks and herrings. The turner makes from it trenchers, dishes, and trays; the joiner, stools and bedsteads, and a variety of other goods. When kept closely trimmed, the beech is very valuable as a screen, retaining its leaves throughout the winter. It also produces an abundance of mast, which is found of great use in feeding swine.

The method of propagating beech is to sow the mast, from October to March, generally in drills about 15 in. to 18 in. apart and an inch deep. The soil need not be very rich. If the drills are drawn from 4 in. to 5 in. wide, the seeds may be sown so as to produce one plant to every two square inches. One year after sowing, undercut the plants in the lines, not less than 4 in. beneath the surface, and trans-

plant the whole the following year. They should be kept transplanted, but no pruning should be attempted until after the final removal. Two years' seedlings may be planted out in nursery rows any time during fine weather, from November to March. Distances of 18 in. by 3 in. will be sufficient for hedge plants, and 18 in. by 6 in. for trees. At the end of two years more remove into hedges, and, when they have stood three or four years, into plantations. In forming seed-beds it is generally desirable to sow thick and afterwards draw the strongest plants early.

F. ferruginea is a broad-leaved variety of American beech, the bark of which is used in tanning.

F. purpurea is a hardy and also a large-growing tree. In spring its leaves are nearly of a blood-red colour, changing in summer to a dull purple. The timber of this tree is said to be best when felled in summer while the sap is in it.

THE HORNBEAM—(*Carpinus*).

The Hornbeam, or hardbeam, derives its name from *carpere*, to crop. Its leaves are ovate acuminate, and somewhat sharply serrated. They generally come out early in April. It is a native of France, Germany, Italy, Southern Russia, and Western Asia. It may be readily known by its feather-nerved leaves, which present a plaited appearance. The wood is very heavy, cross-grained, and difficult to work. The trunk of the tree is often fluted to a considerable extent.

C. betulus is a native of Great Britain, growing in every part of the country, except, perhaps, the most northern portion of Scotland, and also over a considerable part of Central Europe. Its leaves are very similar to those of the beech, but without their glossy appearance. It does not generally attain timber size.

The hornbeam is very valuable as a hedge-plant, especially for use in and around nurseries, as it retains its leaves until late in the winter. It will also stand pruning better than the beech, and it does not rob the land nearly so much. If planted closely it will flourish upon cold clayey land. Its wood is of a whitish colour, and exceedingly tough. It is used in making tool handles and cogs, and is strongly recommended for milk vessels. It also makes good charcoal for cooking, and for the manufacture of gunpowder, and the supply of forge fires. It proves serviceable to the turner, and is said to be superior to yew for mill-cogs.

In suitable land this tree will attain a height of 60 ft., and in some of the woods upon the Surrenden-Dering Estate, in Kent, the rides are flanked with hornbeams of great height, which completely

overarch, and form a shelter in winter, and a most agreeable and nearly impervious shade in the summer months.

As hornbeam seeds come up irregularly when sown immediately after they are gathered, it is a good plan to store them until spring. A bushel of good seed is sufficient for a bed 150 ft. long by 4 ft. wide. As these do not vegetate for a year, it is sometimes customary to take intermediate crops of lettuce, onions, radishes, &c. The seeds should not be covered with more than half an inch of soil. If the plants come up thinly, they may be allowed to remain undisturbed for two years, but when they are thick upon the ground, the strongest plants should be drawn at the end of the first year. These may be planted out in lines 15 in. apart, the seedlings being placed 3 or 4 in. asunder. At the end of another two years, they will be fit for hedge plants. More space must be given to such as are intended to remain longer, or they will become bare at the bottom.

C. Americana attains a height of about 30 ft., is of quick growth, and sheds its leaves early. These are of a deep-green colour, and thickly set upon the branches, giving to the tree a handsome appearance. They bear a close resemblance to the elm leaves.

C. ostrya is also called the hop-hornbeam, on account of the resemblance which its female fruits bear to those of the hop plant. It sheds its leaves about the same time as the elm. It is found growing with the common hornbeam in Germany.

C. orientalis rarely attains a height of more than 12 ft. The branches are set very closely together, and the leaves are small and numerous, hence it is well adapted for low and thick hedges.

A. J. BURROWS.

THE PINE SAWFLY.

A SHORT time since I received a large spray laden with an enormous number of caterpillars of the pine sawfly (*Lophyrus pini*), and having waited till they were apparently perfectly recovered from any effects of the journey, and were feeding heartily, I tried the effect of syringing them with a mixture of a piece of common washing soda, about the size of a large walnut, dissolved in two gallons of water, in which there was a little soft soap. This was a remnant left at the bottom of a pail, so the quantity was not exactly appreciable, but it was somewhere about the sixteenth of a pound.

Many of the caterpillars fell off at once, but I picked them up, and gave them all a second syringing, and in a short time they became motionless, and in ten minutes all appeared to be dead. On careful examination next morning two were found still to have a power of

crawling, the others appeared to be either dead, or past recovery, and I was informed that a packet of them returned to the sender as an example of the effects of treatment, were all quite dead on arrival.

In this year, when sawfly attack of various kinds is so generally prevalent, perhaps some of your readers may be inclined to try the effect of the above, and kindly mention whether it is of any service on a working scale. I noticed that the mixture was fatal in proportion to the extent to which it was allowed to remain (or to dry) on the caterpillar. Such as remained thoroughly wetted with it on the spray, and *on* which it gradually dried—died; also those which had fallen off and remained *gradually* drying, appeared more certainly and rapidly destroyed than a selection which I laid out on a sheet of blotting paper, so that the destructive mixture was partly absorbed.

I think—or conjecture—that this would be serviceable treatment for young trees in nurseries, as the large number that fall (as far as experiment goes) clear the attack very much at once, and the wash clinging amongst the leaves is very detrimental to the caterpillars remaining, both as an external application, and from the effects of such amount as they cannot avoid swallowing.

This year appears highly suitable to sawfly attack.

A species of saw-fly of which we have at present only received the caterpillars, has appeared on meadow-land near Rochdale, in Lancashire. These small grubs are light yellowish below, and dingy above; when near maturity, striped above with dingy green and pale yellow, from the chestnut, or chestnut and brown head, to the tail.

There is also another species found on wheat, near Marlborough, a very minute kind doing harm by completely mining away the cellular tissue between the sides of the elm leaves in Islay.

The above-mentioned sawfly-caterpillars all possess seven pairs of sucker feet beneath the body, exclusive of the three pairs of true feet next the head, and means of progression at the tip of the tail, and by these seven pairs may be distinguished from butterfly or moth caterpillars, which never have so many.

It is well worth bearing in mind that most of the sawfly caterpillars, when full fed, go down into the ground to form cocoons; but sometimes as with pine sawfly, some of the cocoons may be formed on leaves, or crevices of bark, or, as with turnip sawfly, the summer broods may soon come up again. It is however very likely (speaking of the kinds of which we have not yet the life-histories worked out in this country) that, as with gooseberry sawfly, the grubs turning to chrysalis, may remain unchanged through the winter, and from which the sawfly will appear in the following spring.

Where this is the case (for instance under infested elms) a good scraping of the soil and throwing down a dressing of caustic lime, or better still, a thick sprinkling of gas lime, that has been about two months exposed to atmospheric action, would be highly beneficial, either in winter or summer, and looking at the terrible scourge that sawfly attack is when allowed to establish itself, I would venture to suggest that the promptest and strongest measures for destroying the attack on grass or corn would in the end pay the best. Folding sheep on the infested meadows, so that they might not only starve out the grubs but trample them to death, and, also by means of their droppings, poison the ground for attack of the sawflies, and destroy all grubs that the excrementitious matter reached, is a good cure, and one which may be carried out very thoroughly without much expense or inconvenience beyond the requisite care of the sheep; and in the case of the infested wheat (though the idea may seem to some chimerical and overstrained), I believe that rather than this pest should be allowed to gain a footing it would be worth while for the neighbouring farmers to subscribe reimbursement to the owner, and have the field cleared, and the crop burnt at once on the land.

ELEANOR A. ORMEROD.

TO PROTECT TREES FROM RABBITS.

IN reference to what Messrs. Robert, Stalker, and Allen said upon this subject, at pp. 65, 129, and 206, every one interested in this question knows that rabbits seldom if ever bark live rhododendrons or dead twigs of any sort. Whether to, "First catch your hare and smear the tree with his blood," would effectually deter either hares or rabbits from injuring trees, or whether "daubing the young trees" with "bullock's blood," by the aid of a "whitening brush," would be the best and most economical method of preventing young trees from injury by rabbits, because of their dislike to "the smell of blood," and that merely because they are graminivorous animals, I do not pretend to gainsay, but I would remind our readers that rhododendrons do not need the smell of blood in order to be protected from rabbits; nor can it be due to the smell of blood that Corsican pine (*Pinus laricio*) is of all pines the least injured by graminivorous animals—that Norway spruce, when planted out on moors, along with Scotch fir and larch, is the least injured of the three, or that either of those three is least injured the third season after being planted, and less the second, than the season they were planted. From what I have advanced on this subject, it is self-evident that a live rhododendron is safe from rabbits, &c., because of a something in it they

dislike. They do not tear the bark of any sort of dead withered twigs, simply because they are not relished by them. Corsican pine and spruce are more disliked by rabbits than other common coniferae growing along with them. They have a greater disrelish to trees after growing the third season in an exposed barren moor, than they had the season they were newly planted out of the nursery, because, so to speak, they had then more of a green grassy palatable taste, whereas, the third season, they partook so much more of a juiceless dead twig nature. Now the lessons deducible from those facts are, that the barking of young trees may be prevented by an application to their trunks of some substance nauseous to the taste of vermin, whether that be blood, tar, dog excrements mixed with water, &c.

The next question for consideration is, which of the many substances I could name is the most suitable for the purpose, and least injurious to the healthy development of young trees? I say that it is properly prepared common gas, or coal-tar. Before using it, it should be thickened by boiling to such a degree, that when cold it would barely soak through any cotton or woollen cloths dipped into it. When using it the operator should have the tar by him in a bucket, and it should be applied not by a paint brush, but by a large cloth rag, alone, in the bare hand, just as if he were washing the young tree stem with water, and not coating it with tar, and a man should be able in this manner to do 450 trees or thereabout in a day. It should not be applied when the trunks are wet, and warm dry weather is the most suitable. If the tar is too thin it may not only soak through the young bark too much, and prove more or less injurious, but it is so much more perishable, being less able to withstand our variable climate, than when it is thick. As often as it is found too much faded, a fresh coat in a similar manner should be applied. I am aware that several have tried gas-tar and not only found it fail to serve the purpose for which it was intended, but have alleged that they found it actually injurious; and it would be interesting to know from them, the extent of their failure, as well as of the injuries caused; and also how they both prepared and applied the tar.

No doubt Mr. Robert raised a most effectual barrier against rabbits by the use he made of his rhododendron prunings, and Mr. Stalker as effectually served his purpose by the use he made of his heather; nor need Mr. Allen be a whit behind with his application of bullock's blood, but rhododendron prunings cannot always be had, and the finding of suitable heather may be difficult and expensive. According to Mr. Stalker's own showing, after two men had got the heather laid down by them, their day's work of one hundred and fifty trees cost just six times as much money as the tarring could be done for. Bullock's blood is too scarce and too valuable as a fertilizer in this

country, to be easily had in order to be applied to trees, whereas any quantity of gas-tar can be easily got.

No doubt the black stems of young trees look very unnatural, and in bad taste in pleasure-grounds, but I fail to see that bunches of decayed rhododendron prunings, or heather, or the darkish colour caused by blood-daubing, look very much better. When appearance is of the utmost importance, young trees should be planted within rabbit-proof wire netting enclosures, or each tree should have a wire-netting guard round it, say 2 ft. high by $5\frac{1}{2}$ in. diameter, painted green or grass-colour, and tied to light rough wooden pegs, driven into the ground, for say sixpence each; and might, with but little care or attention, suit for similar purposes for many years.

At p. 234, vol. vi., of the Transactions of the Scottish Arboricultural Society, Mr. James Craig, Erskine House, Glasgow, says, "I have tried various kinds of guards with wood stakes and spruce fir branches, but these require to be placed so close that they prevent the free circulation of the air, consequently the plant either gets weak and shambling, or dies." If this theory can be clearly established by facts, then all the modes of protection just alluded to must be injurious, and tarring must be very much so. No doubt Mr. Craig believed in all he said, but I know he arrived too hastily at conclusions without sufficient investigation. Air circulates with less freedom in well-sheltered plantations, in damp, calm, warm weather, than in windy, sunny weather of the same temperature, yet every one interested in the matter knows, that trees make so much more progress under the one condition than the other. We clothe ourselves not to encourage the free circulation of air around our limbs, but to prevent it, notwithstanding the fact that our skins are so much more tender and porous than the bark of trees, and our food and assimilating organs the opposite of theirs, and that an atmosphere suffocating to man, because of the amount of carbonic acid gas or foul air contained in it, might be the best for the healthy growth of trees, and therefore should be but little disturbed by currents of air.

No doubt the most effectual remedy for the rabbit plague is to have them all killed, and by this means kept out, but where proprietors will encourage the increase of rabbits and hares, and wish to grow trees also, their best chance of success is in following out what I have just suggested.

D. MCCORQUODALE.



AGRICULTURAL AND FOREST METEOROLOGY.

IN the last issued part of the *Journal of the Royal Agricultural Society of England*, there appears an excellent, instructive, and suggestive paper by Mr. R. H. Scott, M.A., F.R.S., Secretary of the Meteorological Office, on Agricultural and Forest Meteorology. It takes up in review the conclusions arrived at by the various meetings which have been held on the Continent during the past few years, and dwells at length on the results of the Meteorological Congress held at Vienna in September last. The matter being one of considerable importance in forestry, we make the following extracts from Mr. Scott's paper, as likely to interest our readers:—

The study of climate is, in one sense, only a form of weather prophecy. We determine by long-continued observation the average yearly and monthly figures for temperature, rainfall, &c., and record the extreme variations from these figures. From these data we endeavour to calculate what temperatures, &c., may reasonably be expected to occur. For instance, as regards rainfall, engineers assume, as a rough-and-ready rule, for the greatest amount of rainfall likely to occur in a district, twice the quantity that has fallen in the driest year during the period of observation. This is simply to forecast climate; and the more extensive the basis of observation, the more trustworthy is the result.

Not only is agriculture dependent on meteorology, but meteorology is in its turn dependent on agriculture, or at least on the character of the vegetable covering of the soil, where such exists.

This latter branch of the inquiry is far more complicated than the former, and opinions differ widely as to the effect on the climate of a country which is produced by the presence, or the contrary, of woods.

The greatest difficulty we meet with is that, as the cutting of an extensive forest is not a rapid operation, the full result of the process on climate will only be manifest after a long lapse of years, when the clearing is complete. Now, the variations in meteorological values, especially in rainfall, from year to year, are not insignificant, and before we reason with confidence on the effect of woods on climate, we must satisfy ourselves that we really know what are the true features of the climate of the district in its wooded and its cleared conditions respectively.

Meteorologists and physical geographers are far too ready to make random assertions about the climate of foreign countries, and these are then quoted as if they possessed real value. Thus, for instance, in a very useful work on this subject of the influence of forests on climate,* the author says (p. 225): "In Ireland and Scotland, where the great woods, from which whole districts received their names, have disappeared, nevertheless the supply of water has not diminished:" we may fairly ask Prof. Ebermayer for any figures he may possess to show what was the rainfall of the British Isles three or four centuries ago!

*Ebermayer, "*Die physikalischen Einwirkungen des Waldes auf Luft und Boden und seine klimatologische und hygienische Bedeutung.*" (The physical action of forest on air and soil, and its climatological and hygienic importance.) Aschaffenberg: Krebe, 1873. 8vo.

To resume. The determination of the features of the climate of each district is a work demanding years upon years of careful observation, and for this reason, when the question is put to meteorologists—What will be the effect of planting on the water supply of such and such a district?—the only answer an honest man can give is that he does not know.

Nevertheless, such questions as these are persistently pressed upon the notice of every meteorological official over the whole world; and on the continent of Europe, where agriculture and forestry are the especial care of the State, the complaint that Meteorology does not help the farmers as much as she ought to do has been loudly and generally expressed.

Referring to the meeting held at Vienna in the month of September last, which was attended by twenty-two members, representing meteorology and agriculture in about equal proportions (Mr. Scott says) the only important meteorological organizations in Europe which were not represented at the Conference were Russia and this country, but in our case the Meteorological Society had taken the programme of subjects to be discussed into careful consideration, and had drawn up and forwarded a series of replies to the various questions therein contained.

The meeting was held in the Academy Building at Vienna, and it commenced on the 6th of September, lasting three days. The final outcome of the deliberations is conveyed in the subjoined resolutions.

At the outset it will be evident that the whole of the utterances presuppose the existence of a central agricultural institution connected with a Government department and administering extensive Crown lands. The considerations also have a closer relation to forest management than to simple agriculture, and accordingly several of the recommendations can scarcely be carried into effect in these islands.

With these few words of preface I shall proceed to the consideration of the Report, adding such explanatory remarks as may seem to be desirable, in view of the existing condition of the agricultural and meteorological organizations of the country. The questions of the programme will be given in italics, the resolutions between inverted commas.

QUESTION 1.

What are the mutual relations between the meteorological elements and vegetation: not only those already determined, but those theoretically supposed to exist?

R. 1. "Vegetation is materially dependent on the following meteorological elements:

- a. "Temperature of the air and the soil.
- b. "Duration and intensity of the light.
- c. "All the hydrometeors; consequently the vapour tension and relative humidity; precipitation (rain and snow, &c.), as well as the other forms of condensation (fog, dew, and hoar-frost).
- d. "Motion of the air.

"On the other hand, the daily march of pressure and of ozone appear to exert but "slight influence on the march of vegetation."

The term Hydrometeors is employed in Germany to denote all the

phenomena connected with the presence of water, in any form, in the atmosphere.

R. 2. "Conversely, the meteorological elements appear to exhibit the influence of vegetation in the following ways :

"Vegetation on a large scale (such as pasturage, tilled land, forests, moorland, &c.) gives rise, in each several district, to special conditions of temperature and atmospheric humidity, and perhaps of rain also, and may therefore exert an influence on the climate of the surrounding country in respect of temperature and hydrometeors, and also in respect of the springs."

This Resolution assumes the possibility of dealing with extensive tracts of country on similar principles, as will be seen further on, when we come to treat of the subject of Parallel and Radial Stations.

QUESTION II.

To what observations of meteorological elements is particular attention to be paid with especial reference to their influence on vegetation ?

R. 3. "On the whole, it appears important that, on as many rationally-managed estates as possible, special observations should be carried on of all the elements recognised as important.

"These observations should be made in different soils, and with different types of culture, and should be compared with the crop-returns, year by year, so as to investigate in detail the relation between the vegetation and the climatic factors.

"The general mean results published by the several central meteorological offices do not furnish values in sufficient detail for the study of individual types of culture, or of local conditions.

R. 4. "The Conference approves of Dr. Hann's proposal that the Governments and the agricultural societies be recommended to set on foot such organizations of stations for the study of agricultural meteorology as shall render it possible to ascertain the conditions of climate required by the most important crops, not only in the region where they reach their highest perfection, but also at the extreme limits of their cultivation."

With reference to the latter part of Resolution 3, it is universally admitted that the average results published in ordinary meteorological tables are not sufficiently detailed to throw light on the influence of weather upon agriculture, for the effect must vary with the nature of the soil, lie and aspect of the land, and its height above the sea, and with the character of the cultivation employed. Moreover, the means should be published for shorter intervals than months, say for five days periods, or even for single days.

R. 5. "It is recommended that comparative experiments should be conducted on the best modes of thermometer exposure. (A description of the modes of exposure adopted in different countries will be forwarded to the members of the Conference, as soon as the necessary particulars have been collected.)"

The subject of the best mode of thermometric exposure is one of those about which there exists at present the greatest difference of opinion amongst meteorologists, and it has been repeatedly proposed to publish such a general conspectus of the existing practices as to thermometer observations, but as yet the work has not been done. The method all but universally employed

by the meteorological societies in the United Kingdom is to suspend the thermometers four feet above a grass-plot, in a louvered wooden case like a small meat-safe—the screen devised by Mr. Thos. Stevenson, and named after him.

The idea was, however, broached at the Conference that thermometers destined to give information for agricultural purposes should be freely exposed without any screen at all, inasmuch as plants can have no artificial protection against radiation. The President of the Conference, the Chevalier Lorenz von Liburnau, exhibited such an arrangement, and another came from Italy, devised by Professor Bellani, under the name of the Meteorological Mast, which is to be rigged up with the various instruments.

The idea has occasionally been tried in this country. At Yester House, Haddington, the Marquis of Tweeddale had for many years a set of self-recording instruments freely exposed to sun and rain in the middle of a large field. At Crowborough Beacon also, in Kent, Mr. C. L. Prince has made trial of a plan apparently similar to Prof. Bellani's, but no results have as yet been published.

B. 6. "As regards the hours for daily observation, the Conference is of opinion that when two observations only can be taken, it is preferable to take these in the morning and evening, with the indispensable addition of observations of maximum and minimum temperatures."

The Conference recognises the hours of observation in use in this country, 9 a.m. and 9 p.m., as sufficient, provided that observations of the maximum and minimum temperatures are made. These latter should always be taken at 9 p.m. The old practice of reading both thermometers in the morning and putting down the maximum to the preceding and the minimum to the current day should be abandoned, as it is illogical and may lead to error.

B. 7. "Insolation (or the sun's heat). As no thoroughly satisfactory actinometer is known, observations should in the first instance be taken only at large observatories, on the time, duration, and relative intensity of sunshine (the last named by means of sensitised paper).

"It is recommended to scientific institutions as an important inquiry to devise an actinometer which shall be applicable to the sums of temperature derived from solar heat."

The correct measurement of the effect of sunshine is an extremely difficult problem to solve, for no instrument has yet been invented, or at least been generally adopted in any country, which gives the total useful effect of the sun's heat during a day.

In connection with the subject of the registration of the sunshine it may be interesting to quote the most recent determinations of the difference between the intensity of the sun's heat at different levels in the Alps :—

Locality.	Elevation.	Percentage of possible effect of Sun's rays actually received.
Summit of Mont Blanc	15,781	94
Grands Mulets	10,007	89
Glacier des Bossons	4,000	79
Grenoble.....	700	71

These figures show us that the lowest 15,000 feet of the earth's atmosphere absorb at midday one quarter of the useful heating effects of the sun's rays, and explain to us why the heat is found so oppressive in mountain ascents.

R. 8. "The temperature of the soil should be measured at least at four levels between the surface and the depth of one yard, and the experiments should be conducted in various soils, and with various kinds of crops, &c.

"This investigation most properly belongs to scientific agriculturists and forest officials, and to technical experimental stations."

Earth temperature is a subject to which too little attention has as yet been paid in England generally, but the Scottish Meteorological Society has for many years published such returns, and two very valuable and interesting papers from the pen of Mr. Buchan, "On the Temperature of the Soil compared with that of the Air," have been printed in that Society's *Journal* (vol. ii. p. 273, and vol. iii. p. 211).

R. 9. "Observations on the occurrence of frosts are particularly desirable. The best mode of registering these observations in a form useful for practical discussions is a subject well worth study.

"Of course minimum thermometers are to be employed, but only such as have the bulb quite clear of the frame."

The registration of the occurrence of frosts hardly calls for remark, but there are several points of interest as to the limitation of the damage done to certain parts of a farm, such as the hollows and bottoms, by the cold air flowing down into them, while the fields lying at higher levels escape injury.

In connection with this action of frost a most remarkable experience of Mr. Buchan's deserves notice. It is given in the "*Journal of the Scottish Meteorological Society*," vol. iv. p. 147. In a nursery-garden a net had been stretched over one bed, out of four, of ash-seedlings. The net had holes in it, and was thrown back at one corner. The night was clear, with a very light breeze, and in the morning it was found that the plants covered by the net were damaged, while those in the uncovered part of the bed, even those opposite the holes in the net, had escaped. The destruction was greatest on the sides of the bed and in the furrows.

Mr. Buchan's explanation, which is evidently the true one, is that the net checked the motion of the air, and allowed radiation to exert its full effect. Over the uncovered plants the wind, though very light, removed the cold layer of air as fast as it was formed, so that the temperature never fell low enough to produce hoar-frost. In this case, therefore, the very device adopted to prevent injury from frost had aggravated the damage by interfering with the freedom of motion of the lower stratum of the air.

Thermometers for measuring the minimum temperature on the grass should be placed on props at about 2 inches from the soil, at the level of the tops of newly mown grass.

R. 10. "It seems most important that the relation between the radiation under a cloudless sky and the humidity of the atmosphere should be carefully studied at large observatories."

R. 11. "The methods of photometric observation, with especial reference to the chemical action of light, should be perfected by experiments at scientific institutions, in order to obtain a good chemico-photometric instrument."

The objects mentioned in these two resolutions stand in need of more careful investigation. As regards the action of light, no instrument as yet invented is either quite satisfactory in its results or easy of manipulation.

R. 12. "The humidity of the atmosphere should be measured by the dry and wet-bulb hygrometer and the hair-hygrometer, and, if possible, three times daily (one observation being taken in the early afternoon)."

"As to the apparatus to be used, the Conference recommends comparative observations with the complicated volume hygrometer of Schwackhöfer and the simpler apparatus of Edlmann of Munich, in order to determine which of these arrangements should be finally recommended for use in observatories."

"Ordinary stations should, for the present, employ only the dry and wet-bulb hygrometer and the hair-hygrometer."

R. 13. "The Conference is of opinion that observations on evaporation are important, but that no existing instrument can be proposed for general and exclusive use. In fact, it is recognised as an immediate requirement to devise satisfactory apparatus which will admit of the accurate measurement of evaporation, not only from open water-surfaces, but also from different soils in the fallow and cropped state."

"Meanwhile, observations on evaporation should not be omitted, but they should be conducted with simple forms of apparatus, especially such as depend on the principle of weight, as well as with Piche's evaporimeter, as proposed to be modified by Prof. Cantoni."

Evaporation is a subject which has not yet, in this country, attracted the attention it merits, for few points can be of greater importance to agriculturists than the removal of water from the soil, of which process evaporation is one of the channels.

The form of apparatus recommended is of the nature of a balance, in one scale of which a pan either of water or of earth is placed, and its loss of weight in a given time ascertained.

Piche's small apparatus consists of a graduated test-tube filled with water and inverted, the mouth being closed by a disc of blotting-paper the size of a shilling, this latter is, therefore, the evaporating surface.

R. 14. "Condensation should be observed in all its forms."

R. 15. "The Conference thinks that observations on dew are important, but, in the absence of a thoroughly satisfactory apparatus, all that is required is the careful entry of each occurrence of dew. It is recommended to conduct investigations for the purpose of devising a satisfactory dew gauge."

"As to fogs, the general rules proposed by the Vienna Meteorological Congress in 1873 should be followed."

The only rule about the entry of fogs which was laid down by the Vienna Congress, is that fog should not be reported unless the observer was really enveloped in it.

R. 16. "The observations on rain, for objects connected with agricultural meteorology, should be conducted on the principles laid down by the Vienna Congress."

"It is very important for the purposes of agricultural meteorology that

as large a number as possible of stations of a simple kind should be established, at which observations only of thunder-storms and of rain should be taken."

R. 17. "For the measurement of snow, gauges should be provided, which will prevent the danger of snow being blown out of the receivers."

R. 18. "Observations on the percolation and evaporation of the water in the soil should be introduced into the system of observations in connection with agricultural meteorology, but on no account are Lysimeters to be used."

The Lysimeter consists of a metallic cylinder sunk in the ground and filled with earth. There is a double bottom, and a pipe leads from the apparatus to collect the water which percolates through the earth into the cylinder.

The section of the cylinder is one square foot, and it is made of various depths, from one to four feet. The experience gained at the forest stations in Bavaria shows that the percolation determined by such a gauge is not correct. The earth at the bottom of the cylinder is always damper than the natural earth at a corresponding depth. This Professor Ebermayer explains by supposing that the moisture cannot escape laterally, as the metallic walls of the cylinder are impermeable. He also thinks the area of one square foot too small.

He has now introduced the following plan:—He excavates in an artificial mound five chambers, each 3 ft. 3 in. deep, and 6 ft. 6 in. square. They are separated by walls of porous masonry, 1 ft. 6 in. in thickness. The bottoms are conical, and tubes lead from them into a vault, where the receiving vessels are placed. These chambers are filled with the different kinds of soil, &c., which it is wished to subject to experiment.

R. 19. "Observations on the direction and force of wind should be conducted in the same way as at the ordinary meteorological stations."

R. 20. "In order to investigate the climatic features by which masses of vegetation, such as wood, pasture, moorland, and heath, are distinguished on the one hand from each other, and on the other hand from bare earth, it is desirable to develop further the system of parallel stations, such as were established originally in Bavaria, and subsequently in other states of Germany and in Switzerland. It is also recommended to institute at the forest station of each such pair of parallel stations a new series of observations on the amount of water running down the tree-stems."

R. 21. "It is advisable to organize the system of radial stations, in order to ascertain the effect which extensive masses of vegetation, especially forests, exert on the climate of the surrounding region, both in the immediate vicinity and at a distance.

"This system promises the better results the more continental is the character of the region in which it is tried. In Central Europe, therefore, Eastern Germany comes first, then the Austrian Empire. When any new stations are established, especially radial stations, observations on the temperature and humidity immediately above the tree-crown appear to be of great importance."

The terms "parallel" and "radial" stations require some explanation, and it will be seen that the investigations of which the institution of such stations forms a part, belong in the first instance to forest meteorology, and are of less importance to agriculturists.

In the establishment of each station in the heart of a forest, care has been taken to provide a corresponding or parallel station in the open country adjacent, so as to eliminate any differences in the results which might be caused by differences in the situations of the stations, their distance from the sea, their elevation, &c.

The organization of radial stations has a wider scope, and is only suited for extensive forests, such as those in Eastern Europe. The principle is that a central station is taken in the middle of a large forest, and then, along lines lying north, east, south, and west from that point, pairs of parallel stations are to be established, so as to trace the gradual diminution of forest influence in different directions.

QUESTION III.

To what extent and how can meteorological observatories and stations include special observations for the purposes of agricultural meteorology in the sphere of their operations, without hindrance to their activity in other directions?

R. 22. "In consideration of the requirements of agricultural meteorology which have been already enumerated, the Conference is of opinion that, at least in the larger States, and where distinct organizations for the purpose do not exist, central institutions of a special character should be established. The objects of such institutions should be to perfect the methods of observation, which are in many respects incomplete; to establish subordinate stations, or initiate their foundation; to support societies and private individuals in the foundation and management of such stations; to control their operations, and to collect and discuss their observations.

"Such special institutions should, however, always remain in connection with the general meteorological organization of the country, in regard to the critical selections of methods of observation and of the publications."

QUESTION IV.

Would it not be desirable, with a view to certain special observations which must be taken, such as, e.g., phenological observations, to prepare a general Form of Instructions?

R. 23. "The Conference thinks it advisable to entrust the preparation of general instructions for phenological observations to a small special Committee, consisting of three members. The preparation must be preceded by a careful examination and sifting of the Instructions already existing in most countries. The business of this Committee should be conducted by correspondence, and care must be taken that the observations do not embrace too long a list of plants. They should deal, firstly, with cereals and forage plants; secondly, with the more important forest and fruit trees; and, lastly, with other plants of importance to agriculture, and with the phenomena of animal life."

The subject of what are called in Germany "phenological phenomena," the phenomena of the plant and animal worlds which are connected with the return of the seasons, have for a long time attracted attention in several European countries. Most notably has this been the case in Belgium, where the famous Statistician, the elder Quetelet, published his "Instructions," in 1839, and where the results of these observations have now been published for forty years.

In this country the matter has at various times been taken up, and at the meeting of the British Association at York, in 1844, a Committee was appointed to lay down rules for the observation of these phenomena. The list of plants and animals proposed by this Committee as subjects for observation was a very long one, and accordingly, when the matter was reconsidered in 1874, by a joint Committee representing the Royal Agricultural, the Meteorological, and other societies, the list was greatly curtailed.

QUESTION V.

Can meteorological offices at present issue Weather Forecasts for the use of agriculturists with any prospect of success?

If the answer should be in the affirmative, how should the service be organized so as to attain this object as completely as possible?

R. 24. "The Conference is of opinion that, notwithstanding the existing difficulties of the subject, no meteorological organization can decline to comply with the demand of the public for weather forecasts."

R. 25. "The Conference recommends the representatives of meteorology in different countries to prepare in their own languages, for the use of agriculturists, popular explanations of the principles on which these forecasts are framed."

One cannot but feel somewhat disappointed at these resolutions as conveying the opinions of men more than one of whom has for several years been entrusted with the duty of issuing daily forecasts for extensive areas. I had hoped that at least some estimate of the correctness of the forecasts issued in France and in Germany respectively would have been laid before the Conference. The latest tables of results published by our own Meteorological Office, in its Annual Report, were appended to the letter from the Meteorological Society, of which mention has already been made, and are reproduced in the lithographed Appendices to the Report, but no other office communicated even its own estimate of the value of its weather work. Especially interesting would it have been to have learnt the outcome of Leverrier's system of agricultural forecasts for France, the introduction of which was announced with a great flourish of trumpets shortly before his death. This plan was devised to utilize local weather knowledge as much as possible. Public barometers were freely supplied to Communes and daily summaries of the weather over Western Europe were sent gratis by telegraph. The authorities of the Commune were then required to appoint some official to prepare a forecast daily for the district by the use of the Paris telegram in addition to his own observations of local weather signs.

Such a system as this, only infinitely more completely developed, is in existence in the United States, where the weather service is a purely military organization, and the amount of funds supplied by Congress is amply sufficient to defray the cost of its various developments, being on an immensely more liberal scale than has been dreamt of in any European country. Under this system, not only are competent officers placed at the different centres, and charged with the duty of publishing and issuing

simultaneously the daily charts and forecasts of the service, but a frame, called the "Weather Case or Farmer's Weather Indicator," has been supplied for the last two years to a large number of stations. This contains a barometer and two thermometers—dry and wet—which are set every day at a regular hour. In addition, the frame not only shows what are the average values for pressure and temperature, &c., for the station for the month, and exhibits the latest telegrams received from Washington, but what is most remarkable in the way of utilizing local signs of weather, it provides a disc to show what has been the character of the previous sunset.

A moment's reflection will show that it would be well-nigh impossible to introduce any such system in this country, from the lack of competent officials to manage the frames at the out-stations.

As far as I can gather, the experience of the foreign meteorologists is similar to our own, that a practised judge of local weather signs, such as the appearance of clouds, &c., when kept informed of the general conditions recently prevailing about him, as he may be by consulting the daily weather reports, or even the remarks in the daily press, can form for his own district a more useful estimate of weather than any which can be prepared by any Central Office.

The fact is that farmers expect meteorologists to be far more precise in their predictions than is at all possible. At a recent Agricultural Conference held in Germany, it was stated that forecasts ought to convey correct estimates of the amount of rain likely to fall on the days to which they refer; nay, more, that they should indicate which farms would be struck by hail. If meteorologists were only able to give such intimations as those just named, their forecasts would deserve the title of prophecies instead of probabilities.

As regards Resolution 25, the desire that an authoritative manual of weather knowledge for popular use should be prepared is a very old one. In this country it was expressed by the Committee who reported to the Board of Trade on Admiral FitzRoy's work in 1866. Fourteen years after that date we find that no such book is in existence in this country, and it has hardly been thought of elsewhere! The fact is that the intrinsic difficulty of preparing a manual which shall assign due weight on the one hand to the ascertained relations of wind and weather to the distribution of pressure and temperature, as shown by weather charts, and on the other to non-instrumental observations, such as the appearance of clouds, of the sky at sunset and sunrise, &c., is such as has hitherto deterred any one from attempting the task. The manual recently published by the Meteorological Office, "*Aids to the Study and Forecast of Weather*," by the Rev. W. Clement Ley, is exceedingly useful for those who have some knowledge of the science of meteorology, but is hardly suited for the use of a beginner. My own little book, "*Weather Charts and Storm Warnings*" (Kegan Paul and Co.), treats of the subject only with reference to the weather charts which appear in newspapers.

What is then the lesson to be learnt from the whole Conference? We

have seen that there is hardly a single resolution which affords a definite answer to any of the questions of the programme, and the demand on all sides is for continued observations and investigations.

In this country any undertaking of regular observations must apparently be left to private enterprise, as there is no department of the Government within whose province it would fall; but there seems to be no reason why the Council of the Royal Agricultural Society should not endeavour to enlist the services of several of its members in the cause.

England ought to be able to furnish replies to some at least of the numerous questions which are awaiting solution, as indicated in the preceding pages. If ever we are to have Government Agricultural Training Schools, these would be pre-eminently the stations where agricultural meteorology should be systematically studied.

There is little doubt that if application were made to the Meteorological Society, more than one of its fellows would be found willing to co-operate in the work, for that society has of late selected local climatology as in a special way its line of attack in the prosecution of meteorological research.

These islands are too densely populated and too free from extensive forests for us to expect results of value from any forest stations; but with our humid climate, due to our oceanic position, the results obtainable with the various crops cannot fail to exhibit material differences from those derived from Continental experience, and to throw important light on the mutual relations between vegetation and meteorology.

THE HOME FARM IN AUGUST.

HARVEST WORK.—Peas, rye, turnip and rape-seed, tares, barley, wheat, oats, and beans, will ripen in succession, and these will require cutting at once. None of the cereals should be allowed to stand until they are overripe, as besides the loss of grain the quality of both corn and straw becomes deteriorated. The best millers' samples are obtained from early cut wheat. Barley for malting purposes requires to be well ripened to ensure regularity of sprouting. Small sheaves firmly tied up should be the rule. Thatch all stacks as fast as they are built; pull flax as soon as the leaves fall off and the straw turns yellow, and hemp, as the straw whitens and the leaf assumes a yellow appearance.

Arable Land.—Work all stubbles or grattens as the corn crops are cleared off, and sow turnips, rape, and mustard, or trifolium and Italian rye-grass, according to requirements. Early in the month sow a bed of cabbage on good land for spring transplanting.

Root-crops must still be horse and hand hoed. Set out late swedes and turnips, and single early. In districts where hop picking or

other work demands all hands after the end of August, late turnips may be sown broadcast and thinned by heavy dragging.

Manures should be carted from the yards and clamped ready for use in the fields. A layer of chalk or fresh soil will form an excellent bottom, and gypsum may with advantage be mixed with the manure and scattered over the heap to fix the ammonia. A portion of the rotten manure may at once be applied to young seeds or the mown meadows.

Hops will still require light shimming or nidgeting to keep down weeds and loosen the soil. They should also be hilled early in the month. Upon wet clays run the double mould-board plough down the centre of the alleys, and shovel up the soil towards the hills. Where mould appears, use the sulphurator at once. Make every preparation for hopping by laying in coal, coke, brimstone, and burning charcoal. Prepare hop-pockets and green bags or pokes.

Live Stock of all kinds should have additional room upon the pastures. Lucerne, tares, comfrey, and the second cut of rye-grass and clover will now be available. Wean lambs, and sell off superfluous stock as grass keep lessens. Pigs may be turned on stubbles. Fattening stock should be supplied with cake or corn.

Poultry.—Run geese and turkeys upon the stubbles and feed up ducks for market.

Estate Work will now demand but little of the work of the horses, as these will be required in carting corn and working stubbles and fallows. Buckwheat grown for game should be cut before it is over-ripe, then thoroughly harvested and stacked in convenient places for feeding. In hot dry weather this crop requires careful handling.

A. J. B.

FUSION OF THE BRANCHES OF A BEECH TREE.

WHILE walking lately by the beautiful little lake near the dairy in Arundel Park, my attention was attracted by what seemed to me to be a rare phenomenon in tree growth. One might call it, for want of a better term, a "bifurcation of the stems of a beech tree." The ground on the left of the lake—chalk with a thin layer of loam—rises at an angle of 76° , and growing from this, with its branches drooping gracefully over the water, was the tree in question, its gnarled and moss-grown roots exposed by the crumbling away of the earth. The tree had two stems of about equal thickness, one stem nearly upright, the other leaning at an angle of say 50° over the lake. At 8 ft. from the base an arm 8 ft. long, and from 7 to 9 in. in diameter, stretched from the upright to the procumbent stem. The arm was considerably larger at its junction with the stems. The tree was probably forty-five years old. I assume that the stems as high as the arm were once only roots or underground stems, and that the growth of the tree resulted in lifting the stems, and with them the arm, to their present position. The suspended trunk evidently owes its security and existence to the friendly arm outstretched to hold it.—T. W., Hervey, in *Gardeners' Chronicle*.



ENGLAND.

THE present month should as much as possible be employed in making preparation either by steam cultivation or by the work of horses for autumn planting. Where the soil is heavy and it is not intended to break up the whole of the surface, pitting should be carried out early.

Finish pruning and remove the produce, and mow and trim up wood-rides. Well work any land intended to be laid down, whether for forest lawn, or rides. Transplant hollies at once, if this has not already been done, and other large evergreens towards the end of the month. Look over trees in parks and other ornamental pastures, cutting off browsed and injured branches.

Heavy work may be looked for in plantations formed last spring, as the summer's drought has told upon these. Continue to hoe and nidget in such, to keep down weeds and prevent their seeding, and take account of dead plants so as to replace these in good time.

Give hawthorn hedges their last switching. Paint and tar iron and wood fences, and creosote posts and pales for new work. Transplant trees which have been raised from cuttings and layers, such as yew, laurels, &c.

Hoe and clean in the nursery and prepare quarters for October planting by trenching and manuring. Prune up young trees intended for autumn removal. By the end of the month put in cuttings of laurel, holly, bay, privet, and yew.

Layer from prepared stools in the nursery, selecting strong shoots of one year's growth. In thinly-stocked woodland quarters take layers of two years' growth, giving these an undercut with the knife, firmly pegging them down, and covering up the partially severed portion with a few inches of fine soil. If the land be very poor, a compost or some manure may with advantage be worked in around the stool. With tolerably good soil the layer may be cut away from the parent stool at the end of the second year. But wherever it may be found necessary, the shoots may be again layered at the end of two years, the cutting away being delayed until two years after the last

layers are made. By following out this system such hardwoods as the oak may be established upon rocky surfaces where the soil is too light for planting. A little loosening of the rock and the addition of a shovelful of fine soil are all that will here be required.

Pluckley, Kent.

A. J. BURROWS.

SCOTLAND.

CONTINUE the pruning, thinning, and cleaning of young plantations and hedges, also the making of new and the repairing of old plantation roads, as recommended last month.

The preparation of ground for next season's planting should now be in an advanced state; and where the fencing or draining of such has yet to be done, it should now be speedily accomplished. It is important to have every plantation of any extent conveniently intersected with one or more *main* roads; and any work—if not very extensive—connected with the formation of these roads can generally be conveniently executed in frosty weather during the planting season.

Complete the cleaning and repairing of all main water-courses and wet ditches, and mow their banks where necessary.

Mow and clean shooting rides, carriage drives and walks.

Hoe and weed in the nursery; bud hollies, &c., early in the month.

Cuttings of evergreens may be inserted towards the end of the month. A northern exposure and a sandy soil is most suitable.

Darnaway, N. B.

D. SCOTT.

IRELAND.

THE work of clearing young plants from rank vegetation of all kinds ought not to be delayed beyond the middle of the month. If this is neglected, infinite injury will be done. Sides of open water-courses ought also to be cut, and all weeds found near plantation fences.

Keep young thorn fences free of weeds and grass. These should be dug or forked. Nothing destroys the thorn equal to being allowed to get over-run with weeds.

Finish pruning of forest trees; mark timber for future felling. This can best be done when the trees are well furnished with leaves, because it enables one to select the unhealthy, and such as are proper to be removed.

The pleasure-ground will require a good deal of attention this month; mowing grass, facing and rolling of gravel walks, and

keeping everywhere in unity with the bloom of the season. Where not finished before, cut and trim evergreen hedges and edging. If watering is attended to, transplanting may be begun toward the end of the month.

Thin young woods, and sell the produce. This is a good time to dispose of posts and rails, as all are requiring fencing for the after-grass. Fencing stuff is generally in great demand at this season.

D. SYM SCOTT.

WALES.

CONTINUE the fencing, clearing, and preparing of ground to be planted during the coming season, as recommended last month. Where draining and loosening the ground is necessary, it should be done at once, so as to be in good condition for planting in the autumn.

Mow, and clear up all plantation rides and drives; also clear herbage and other *débris* from open drains. Where game is abundant, such work should, if possible, be finished up before harvest operations are commenced.

Keep all fences in good repair, and continue tarring and varnishing wood and iron work during dry and warm weather. The switching of thorn hedges may also be commenced towards the end of the month. Clean carriage drives and walks, and mow grass lawns. Keep the hoes going in nursery grounds, &c.

LEWIS BAYNE.

A NEW SPECIES OF APHIS AFFECTING THE PINE.

AMONG our native forest trees, none, unless it is the oak, suffer more from the depredations of insect enemies than the pine. Distributed as it is, from the Arctic to the tropics, climatologically speaking, it becomes a prey to every conceivable form of insect life.

Already its enemies may be reckoned by hundreds; but, notwithstanding this, hardly a year goes by without some careful investigator adding others to the list. It is not the intention of the writer to enter into full details or enumerate all of its foes, but to call the attention of entomologists to a new aphis affecting a pine in Florida that has evidently been overlooked by others.

For the past two years we have detected numerous large brown plant lice upon the common pine of this region (*Pinus australis*), which for want of time we have left unmolested. They cluster together upon the new and tender branches, which they puncture with their remarkably long beaks, causing the sap to exude and the branch upon which they exist to become gummy and sticky. In their habits they are exceedingly shy and timid. On disturbing them they invariably seek safety by hiding between the needles of the pine; indeed, even on hearing approaching footsteps, we have observed them cling closer to the limb, while a few skelter off where the needles are denser.—*Scientific American*.



EFFECTS OF FROST IN MAY.

SIR,—In the early part of last month a severe frost passed over the various districts in Perthshire, doing great damage to forest trees, fruit trees, shrubs, garden potatoes, flowers, &c. The common silver fir (*Picea peckinata*) seemed to suffer most of all, more particularly the plants in the nursery and in young plantations. The young growth was then well forward, and was quite killed and withered, giving the trees an unsightly appearance. The top shoots in young plantations did not suffer, but for at least three-fourths up the tree they were quite killed. The common spruce and Scots pine were all blasted on the most exposed sides, the young shoots on the common beech all shared the same fate, and even the hedges are quite blasted in exposed situations. *Picea Nordmanniana* did not suffer in the least, from the fact of its coming later into leaf than the common silver fir. Another feature of the past winter is that, while many of the common sorts of rhododendrons were killed, "hybrid" sorts stood the rigours of the winter without being the least damaged.

DEUNTH.

FERN AND BRACKEN DEGENERATING.

SIR,—There are large patches of fern or bracken in the park here, which is gradually degenerating, and grass or other rough herbage taking its place. Can any of the readers of the *Journal* suggest the cause, or has any one noticed the same elsewhere? Is draining beneficial or injurious to

its growth? We had six degrees of frost here on the 9th of June, which killed the young shoots of the fern in patches; other parts were not injured. I notice that on dry banks, where last year it was so strong that the beaters with a shooting party could scarce get through them, it is coming up this year very irregularly, and in some places not at all.

JAMES CRAIG.

Weston Park, Shifnal, Salop,
July 6th, 1881.

THE INDIAN FOREST DEPARTMENT.

SIR,—I would ask permission to correct a certain amount of misapprehension which seems to me to exist in the letter of your correspondent "Astutia" in the July number, and, if you will permit me to add it, in your remarks thereon, as to the duty of a forester; for after all, whether he be an individual or whether it be a department, the duty must be the same. Perhaps I may say no better argument could be found for the establishment of a forest school in England, which you advocate with reason, than can be found in his letter.

"Astutia" seems to think that it is the business of forest management to cheapen timber for the merchant or contractor; but the first maxim which any forest school would teach is that a natural forest represents so much capital in the shape of timber entrusted to the forester's care—as money is to the bankers—and that you can only remove with safety in any one year the amount of timber (woody material) which the soil can

produce in one year. A crop of timber differs from a crop of wheat in that the ground is not cleared annually; but not the less does nature do in a forest the same work as she does in a wheatfield, giving the trees certain elements in certain proportions, which may be taken away again without loss in the shape of timber, and which form in fact *the interest on the capital*, which is represented by the standing timber on the ground.

The case of plantations, where the crop is raised to be disposed of for a specific purpose when it has attained a certain size (as hop poles, scaffold poles, mine stays, &c.), is somewhat different, as the trees are cut before arriving at maturity; but whatever the case may be, if the *role* of the spendthrift is to be avoided by the forester, forest work should be so arranged that the produce may be withdrawn at regularly stated intervals, and in proportion to the rate of growth of the forest over a given period of years. That the annual produce should be sold to the best advantage is self-evident, but it is no part of the forester's business to do anything to cheapen timber by throwing an abnormal supply of it into the market in any one year. Any such action is sure to act unfavourably on the forests by creating an irregular demand.

I have no knowledge whatever of the case referred to by "*Astutia*," but the fact that the Darjeeling Tramway passes for a few miles through a Sal forest can be no possible reason for permitting over-felling to take place in that forest simply to convenience the contractors, Messrs. Burn & Co. One may possibly sympathize with their feelings, however—"*Water, water everywhere, and not a drop to drink*." If I may be permitted to guess, they probably desired to cut down all the trees they required on payment of a certain royalty per cubic foot; but if this somewhat natural desire on their part were listened to,

forest conservancy would be at an end. As no doubt they were paid a full price for their sleepers, it was no harm to let them purchase them in Calcutta and bring them up, thereby relieving the forest from drain. I left the Indian Forest Department eight years ago, and as I am as free from all control by it as "*Astutia*" himself, perhaps he will find confidence to accept my explanation.

G. F. PEARSON,
Col. (Retired) in Charge of English Pupils, Nancy Forest School
Nancy, July 4th, 1881.

DISEASED LARCH.

SIR,—I send by train this day specimens of larch which have been injured, as I consider, by the disease aggravated by the frost, and shall be glad if you can favour me with your opinion. Very great damage has been done to larch plantations in this district the two last years, but especially the last year. I have instances on property under my charge where whole plantations have been destroyed and others where more than three-fourths of the larch are so injured that they will have to be felled. I observed that trees over twenty years' growth and under five are not affected; I also noticed that the lower-lying portion of the plantation, especially where damp, is more affected than the upper.

The question is a very serious one for this district, which I have generally considered as eminently well adapted for the growth of larch, and I have, during the last few years, planted very largely; but I now fear we shall have to abandon planting any more larch unless some remedy can be found.

I shall feel very much obliged if you will kindly give the matter your attention, and favour me with your opinion in your next issue.

EVAN POWELL.
Llanidloes, Montgomeryshire,
July 23, 1881.

[A bad case of "blister" on the larch. Much has been written in our pages and elsewhere on this subject, but the origin of the "blister" is still involved in obscurity. It is quite probable that it may arise from any of the causes suggested by our correspondent, but we have still too little proof of the real origin of the disease before us, to enable us to express a decided opinion upon the subject. The recent bad seasons have undoubtedly had an injurious influence upon larch, as well as upon most others of our forest trees, and the appearance of "blister" during these years in larch plantations, which were previously clear of it, may be reasonably set down to the inclemency of the seasons. Still we want incontestible proof that it is so, and we hope that this matter will be cleared up at an early date by those best able to form an opinion on the subject. In the meantime, our correspondent need not despair in ultimately getting larch to thrive and grow into profitable timber, even although afflicted with an attack of "blister" now and again.—Ed.]

SPRUCE FIR GALLS.

SIR,—There is a curious abortive cone-like excrescence growing on the young spruce firs in this district. The three specimens which I herewith enclose for your inspection were obtained from trees, varying from 18 to 30 inches in height, growing in nursery lines. I have not found it in any of our plantations yet. You will see their habitat is at the junction of the lateral shoots, with the leading one of this season's growth. On dissecting the "cones" they at

first sight appear to contain the usual seed cells, which are filled with what seems a minute powder, but on being subjected to high microscopic power are found to be what I think a variety of "coccus."

As this pest is unknown to me, I venture to ask if you will kindly give what knowledge you possess as to the origin of it, and what would be the most effective method of preventing its recurrence? A. R.

[The cone-like growths sent by our correspondent are the work of the Spruce Gall Aphis, which has been rather common in many parts of the country for some years, and does much harm to young spruces that are badly infested with it. In the present case it may have appeared on the young trees in the nursery from a variety of sources; but most probably it has introduced itself from some infested plantation not far distant. It is not usual to find it numerous on young trees in a nursery, its common habitat being on older trees, which are often in a sickly state previous to the attack. Healthy, vigorous growing trees are not so liable to attack, although we have observed even these to be severely attacked during recent years. In this instance, where the trees are still in the nursery (and where the plantations appear to be clear of the insect), they should be at once rooted out and burned, so as to destroy all trace of the aphis. If such trees are put out in the plantations, it is more than likely that the insects will multiply and spread, to the serious injury of the spruces; and while a tree of the kind remains, there will be no possibility of getting rid of the vermin.—Ed.]



We are glad to learn that the Parliament at the Cape of Good Hope has sanctioned the appointment of a Forest Commissioner, and granted for him a salary of £700, with an additional allowance of £100 per annum for house hire. In the discussion it was stated that "it was impossible to obtain a man from England,"—that the Commissioner appointed was said to be "highly qualified, but he could not speak English, being a Frenchman,"—and that the Commissioner of Crown Lands and Public Works "had the greatest difficulty in getting this gentleman at the £700."

* *

We learn with regret that Mr. Scaling, whose name has been well known in connection with the cultivation of osiers on a large scale, at Basford, Notts, is about relinquishing this business and going abroad. It is stated that the restrictions placed by a "paternal" government on the employment of labour, especially in the case of women and children, has made the profitable cultivation of osiers in England impossible in the face of the severe foreign competition.

* *

Under the name of "Potentite," a new blasting compound has been introduced by the Liverpool Cotton, Powder, and Ammunition Company, which will probably prove highly useful in the removal of old tree stumps. The chief difference between this new explosive and dynamite and gunpowder consists in the fact that the action is downwards

more than upwards, and consequently that a charge properly directed seems to shake the root to its lowest limits.

* *

The island of ^{*}Bute, in the Firth of Clyde, has long been celebrated for the mildness of its winters and the salubrity of its climate, and is a well-known favourite resort of health and pleasure-seekers, from the busy towns in the West of Scotland, as well as from more distant parts. From an interesting report on the *Meteorology of Bute*, for the year 1880, with which we have been favoured by the author, Mr. James Kay, forester on the Bute Estates, we observe that the lowest temperature for the year occurred on the 20th of November, when the thermometer fell to 22° or 10 degrees of frost; while the maximum temperature only reached 79° on the 14th of August. This indicates a very equitable climate, which, combined with a certain degree of moisture, is extremely favourable to the growth of many exotics which can hardly exist in the open air in less favoured parts of the country. Hence, we are not surprised to hear of many fine specimens of trees and shrubs, generally reputed to be too tender to withstand our climate, which are to be seen growing and thriving vigorously on the islands and around the shores of the Firth of Clyde. It is just the home for trees and shrubs from New Zealand, Tasmania, the southern parts of America, and the islands and shores of the extra-tropical parts of the Great Pacific Ocean.

From Mr. Kay's notes on the season of 1880 in the island of Bute, we learn that the larch was in full leaf on April 12th; planes at Mount Stuart on the 16th; hedgerows nearly green on the 18th; limes half out on the 29th; and on the 30th, beech, birch, white poplar, and Lombardy poplar, bursting into leaf. On May 4th, Spanish chestnut was bursting into leaf, followed by ash on the 14th, and on the 17th early beech had shot 5 inches, and plane 2 inches. On the same date lilacs and thorns were in flower; horse-chestnuts in flower on the 18th; plane on the 19th; and rhododendron on the 21st. Oak and early ash leaves were half out on June 1st, while some of the late ash were "not yet in leaf" on the 10th. The leaves of plane trees began to fall on September 1st, and those of the lime tree on the 7th. Frost appeared on October 21st, and tree leaves began to fall generally on the 25th. It is also noted that the harvest of 1880 was a month earlier than that of 1879. Rain fell on 194 days, the total amount being 38,814 inches, or about 10 inches less than the average rainfall in the island.

 Remarking upon the general characteristics of the weather, in the island of Bute, during the month of November, last year, Mr. Kay says, that sharp frost prevailed from the 16th to the 22nd, followed by a fierce gale on the 26th, which blew down upwards of 800 trees on the island. Among them were several old and remarkable trees. The largest and finest beech tree in Kames Castle grounds was split from top to bottom, and what remained standing was so badly injured as to necessitate its removal. The other notable trees grew in the policies at Mount Stuart. A tall ash, 134 ft. high, said to be the tallest ash in Scotland, was blown down, and two fine beeches growing near by, in the beech walk, were snapped across at about 30 ft. from the ground. A notable ash tree,

known as "Eve," on the side of the road at Eden Place, had one of its principal limbs wranched off. Mr. Kay thinks the gale was not quite so fierce as the memorable "Tay Bridge" gale of the previous year, and about as many trees uprooted owing in part, he believes, to the loosening effects of recent frost.

 We regret to notice the death, at the age of 55 years, of Mr. George Reid, senior partner in the well-known Aberdeen firm of Benjamin Reid & Co., seedsmen, nurserymen, and implement manufacturers. Mr. Reid always displayed a keen and intelligent interest in the acclimatization of ornamental and timber trees, and in the nurseries of the firm the rarer conifers have always held a prominent place.

 We understand that in Ireland the cultivation of Timber is increasing, there being an excess of 3,000 acres devoted to woods, &c., this year compared to last.

 The Society of Arts recently offered a prize of £5 for the best plant label, but although 120 specimens were sent in, none of them were considered of sufficient merit to deserve the prize, which was accordingly withheld. The committee think that wood is the best material for cheap labels, but a method of preventing them from rotting and the inscription becoming illegible is needed. Some plan of perfect kyanizing or treatment with paraffin is wanted. Slate labels when thick enough, and thick glass labels might also be useful.

 It was reported that the magnificent plane tree in front of the old entrance door of the South Kensington Museum, stated to be the finest in London, was about to be cut down. We have made inquiry of the Director of the Museum as to the truth of the report, but have received no reply.

It was a fitting tribute to the city of Edinburgh, as the head-quarters of arboriculture, that the Duke of Edinburgh on the occasion of his recent visit to Leith to open a new dock there, should have planted a memorial tree in the grounds of the Royal Botanic Gardens. The Duke was received at the gardens by the curator, Mr. John Sadler, and planted a fine young Hungarian oak. In 1863, as a student of the University, His Royal Highness planted in the gardens an *Abies Albertiana*, which is now 20 ft. high.

Lord Brabazon has given the sum of £50 to the National Health Society for the purpose of placing seats and planting trees, in suitable positions in London. We hope the money will be spent to better advantage than has been the case in some recent instances of similar generosity.

We learn that on Sunday evening, July 24, a whirlwind passed over Thirsk, by which some fine trees were deprived of their larger branches and others uprooted. Several of the old trees in Thirkleby Park, the residence of Sir W. Payne Gallwey, severely suffered.

We hear that the effects of the severe frosts of last winter have been very marked in the Midlands. In Leicestershire many comparatively hardy trees have been killed outright, especially a number of very fine poplars at Lutterworth, Kimcote, and other places, some of which are stated to be more than 100 years old.

In another column we give some notes on the implements and machinery likely to interest our readers which were exhibited last month at the Royal Agricultural Show at Derby. Of the stock, the quantity exceeded that on any former occasion, and the average quality was superior, so much so that the judges

could with difficulty pronounce their decisions. The entry of horses was very small.

The establishment of a School of Forestry, in Virginia, U.S., is talked of, in connection with a scheme for laying out an extensive park. It is reported that the Natural Bridge tract has recently been purchased as a part of this undertaking.

A second edition of the Forest Department Code, of the Government of India, has been recently issued, and contains voluminous details of the organization of the Forest Department, and the management and working of the forests; besides full instructions concerning office and financial business, and other matters of detail in the arrangements of the Department. The Code has been carefully revised and corrected to the end of March of the present year, and a copy of it is sent to the different local governments and administrations of India which its provisions effect, and to the superintendent of the forest surveys and others interested in forest management in India. The volume should be in the hands of all those who are training young men for the forest service, and should be carefully read by the candidates for the appointments, so as to inform themselves of the nature of their duties, and the work that is expected from them. For this purpose alone, it will fully repay a perusal; but even to the general reader, there is much of an instructive and interesting nature, upon the system on which the extensive forest areas of India are managed and worked for the benefit of the public. The Code is well-devised for the purpose of successfully and profitably conserving the Indian forests; but the important work of carrying out its edicts, in the best manner possible, must, of necessity, be left in a great

measure to the individual energy and ability of the district conservators.

* *

The forthcoming excursion, on the 2nd and 3rd inst., of the Scottish Arboricultural Society to the Forests of Morayshire, promises to be as great a success as any of its predecessors. The arboral features of the district can hardly be equalled, and for picturesque scenery and rural attractiveness few can surpass it. It is therefore in accordance with our expectations that we hear there is likely to be a large muster of the members of the Society, many of them coming from distant parts to join in the excursion. For those who have never visited that far-north part of Scotland there are numerous attractions, besides those included in the two days' programme of the Society, and a week or two can be most profitably and enjoyably spent in exploring the romantic hills and glens and richly cultivated plains of Moray. None will regret the long journey, or feel wearied amid the abundance of objects of an attractive and interesting nature, and we would strongly advise all arborists, whether they are members of the Scottish Society or not, to make a point of including this excursion in their summer rambles, and enjoy to the full the many attractive features that are certain to present themselves during its progress. All will be welcomed by the enthusiastic local committee, who have taken every possible means to provide for the comfort and enjoyment of the company, and are working with energy and heartiness to make the affair a complete success.

* *

The action raised by Lord President Inglis against the Shotts Iron Company for alleged damage done to the trees on his estate of Glencoe, near Edinburgh, by the defenders calcining ironstone in the neighbour-

hood, came before the Second Division of the Court of Sessions lately, on an appeal by the defenders, and after several days' debate, judgment was again given in favour of the Lord President, by a majority of the Court. The case was, as usual in the Scotch Court, tried before three judges, who each summed up the evidence, and expressed their views on various points of the case, before judgment was delivered. A wider divergency of opinion could not be found on any important case than appears to have prevailed among the judges who tried this very important one, which shows it to be of such a nature that legal acumen fails to clearly set it forth, and upon which only experts can be expected to form a correct opinion. However, the case has been appealed to the House of Lords by the defenders, and till a final decision is given, its many remarkable features cannot be treated with the freedom they deserve.

* *

The plague of insects has been unwontedly severe on trees of various kinds throughout the country this season, and has in many parts been even more disastrous to our food crops. In every other civilized country in the world steps would at once be taken by the Government to investigate the cause of such a widespread evil, and to test every available remedy till something effective in getting rid of the pests, or at least in lessening their ravages, had been discovered. Some of the time of our legislators, which is spent in the pursuit of remedies for much less evils, might be profitably devoted to this subject, which, by the enactment of certain laws and proper supervision in carrying them into force, would save the country a vast sum annually. The country is solely indebted at the present time to private skill and enthusiasm, for the knowledge and means we possess for ward-

ing off the attacks of all-devouring insects, and especially to such zealous workers in this important field as Miss E. A. Ormerod, who, along with a few others, labours most indefatigably in spreading information about such insects, and the best modes of eradicating them. The attention of the Government could scarcely be better employed for a short time than in devising some efficient means of preventing such a heavy national loss as we annually suffer from the ravages of these insidious pests.

* *

The ravages of the oak leaf-roller caterpillar, *Tortrix viridana*, and one or two other species of insects, the larva of which feeds on the leaf of the oak, have been excessively severe this year in the southern and midland parts of the country. The prevalence of dry, warm weather, has no doubt been favourable to the production and spread of these insects; but the destruction of insectivorous birds by the severity of the past winter, as well as is too often the case by the wanton hand of man, has probably had a considerable share in the noted abundance of caterpillars this season. It is scarcely probable that art or science will ever discover any effective means for protecting forest trees of a large size from the ravages of these insects; hence the greater the necessity of protecting, by every possible means, all birds that are known to prey upon insect life. The nests of such birds should be protected with the greatest care; and it should be a crime, liable to heavy punishment, to kill one of these birds. They are the natural enemies of vast numbers

of insects injurious to man; and when they are present in sufficient numbers, they are generally able to give a good account of hosts of these devouring pests, by destroying the earliest broods the moment they appear, and thus effectually preventing their increase.

* *

The fifth annual report of the Aberdeenshire Agricultural Association, which reached us lately, is full of matter of deep interest to the agriculturist, and should be read and carefully studied by every farmer in the country. Comprehensive details are given of the careful experiments made by the Association on the effect of various descriptions of manures on turnips, oats, and grasses, at several stations in Scotland and England, with the result, that phosphates of lime applied to a turnip crop materially increase its value; but that it is of no consequence, as hitherto generally supposed, whether the phosphates are of animal or mineral origin. Insoluble phosphate has been proved to be about as effective as soluble phosphate, and the use of the former by the farmer will effect a considerable saving in his manure account. The experiments have been most diligently carried out for a series of years, under the skilful superintendence of the chemist to the Association, Mr. Jamieson, F.I.C., Aberdeen, and the important results obtained are likely to prove highly beneficial to the agricultural interest, as well as reflecting great credit on the Association for its energy and public spirit in these times of hardship and distress among the agricultural community.



THE ROYAL AGRICULTURAL SHOW.

This annual show, which is the representative one of the many agricultural exhibitions now held in almost every district in the kingdom, was held this year at Derby from the 12th to the 18th July. It will rank as one of the most successful provincial meetings ever held by the society, no less than 128,095 persons having paid for admission during the week, the total gate-money realising £9,385. To this must be added the money received for season tickets, and for admission to the grand stand and working dairy, which will probably bring the amount up to quite £10,500. As during the recent years the amount required to be made up by admissions has usually been about £8,000—a sum that has only on nine previous occasions out of 43 been obtained—the prize list was this year cut down by about £1,000, so that £7,000 would have cleared all expenses, and it may, therefore, be now safely estimated that the society will gain by the show at least £3,500; while, when the profits on the catalogue and the sale of the timber comes to be added, the amount may run up to £4,000. Should this be the case the gain to the society will be greater than at any other show except Leeds in 1861, when a profit of £4,471 was made, and even if only £3,500 be cleared, it will only have been exceeded twice, viz., at Leeds, and at Liverpool in 1877, when £3,947 was added to the society's account. When last the meeting was at Derby, in 1843, a loss of £3,184 was the result.

In the implement department 5,960 articles were entered for exhibition, all more or less directly connected with agriculture.

The leading agricultural engineers exhibited as usual magnificent displays of engines of all kinds and types. Messrs. Ransomes, Head and Jeffries showed portable, traction, and vertical engines of first-class workmanship and design. Marshall, Sons, and Co., in addition to their steam engines, exhibited two circular saw-benches. Clayton and Shuttlesworth, Lincoln, although exhibiting no novelty, were well represented by a good display of their specialities.

The following are particulars of some of the exhibits of interest to our readers:—

Jas. Dickson & Sons, Newton Nurseries, Chester, exhibited at their stand some choice specimen coniferous plants and samples of farm seeds of all sorts for present sowing, also drain cleaning rods, &c.

Barron & Sons, of the Elvaston Nurseries, Borrowash, Derby, exhibited their transplanting machines, a notice of which will appear in our September issue, giving terms for the hire or purchase of them. The stand occupied by the firm was attractively decorated with flowers, and specimens of grasses and clover grown from their own seeds.

Ben. Reid & Co., of Aberdeen, had on view their tree root and stone extractor, patent drain-cleaning rods, and a new straining post for wire fences.

Hill & Smith, Brierley Hill Iron Works, as usual, made a fine display of their continuous flat bar fencing, tubular fencing, flat bar hurdles, round bar hurdles, sheep folding hurdles, strained wire fences, field gates and pillars, rick stands, piggeries, &c., &c., all of which manufactures are too well known to need any special reference. An attractive feature on this stand was a pair of elaborate wrought iron entrance gates, with railings to match, in the Italian style.

Hydes & Wigfull (Limited), Stanley Works, Sheffield. This well-known Sheffield firm exhibited a good selection of their specialities in the manufacture of wrought iron continuous bar fencing, hurdles, field gates, tree guards, &c. We noticed the exhibits of this firm some time back, and need only say that their manufactures—especially the patent “lock-bar” hurdles—are all worthy of attention.

Francis Morton & Co., Limited, Liverpool,

exhibited strained wire fenceings, and a vast number of articles worthy of attention, including wrought iron straining pillars, angle-iron standards, for wire fencing, palisading, hurdles, &c. A continuous flat bar iron fence

is made by this firm on the principle of self-locking, with rivetted earth-plate standards, manufactured without a weld. By means of these self-locking joints a perfect rigidity is maintained through the entire stretch of fencing. A patent "opening stile" was likewise exhibited, which, by a simple arrangement, answers a purpose most needed in field stiles—an effectual bar to the ingress or egress of cattle.

E. C. & J. Keay,

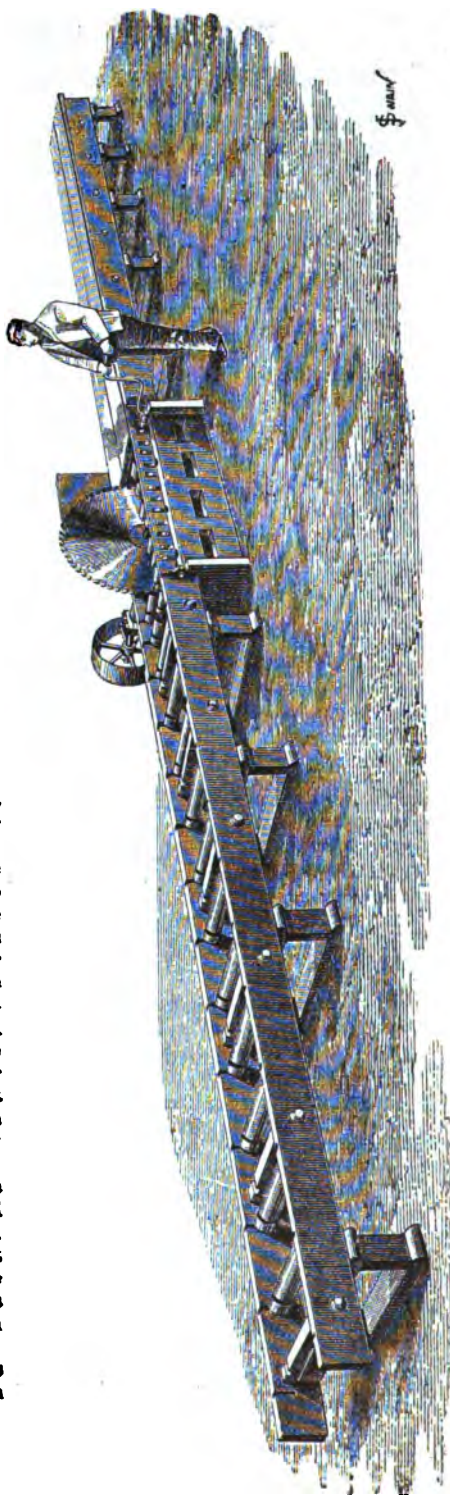
Cyclops Works, West Bromwich, exhibited a capital hurdle, making a good fence against sheep and cattle, and not being fixed in the ground is easily and quickly removed. In a long line of this fencing an occasional stay is all that is necessary. The same firm exhibited a flat tubular Sheep Pen made with flat tubular hurdles. Being self-fixing it is well adapted for hard or frozen ground. It is very light though strong, and the price is very low. We understand these pens have been used for some time in South Africa on some of the sheep runs.

W. Allchin,

Globe Works, Northampton, exhibited portable and fixed engines and agricultural implements, as well as a rack saw bench and band-saw machine. These two machines are the best articles of their kind manufactured for use in the forest or in the saw-mill. They are portable, and at the same time can be easily fixed and set to work. They are well known at the stand of Mr. Allchin at the various Royal and local shows, but other manufacturers have given these two necessities in the timber merchant's trade scarcely any attention, and we believe their like would not be found at the stand of any other engineer. They both supply a want long felt in the timber trade, and we are glad to know their merits are duly appreciated.

The rack bench with hand feed is far before the ordinary timber or deal frame. The timber is easily rolled on the bench, and the man can so adjust the feed to suit the timber as to make the most of the power used, and this means a great deal in sawing, which requires so much power.

It will take a 6ft. saw. The tail is 16ft. long of red deal 9×3, with



W. ALLCHIN'S RACK SAW BENCH.

stretchers of deal and wrought iron stay bolts with cast washers. The middle frame is made entirely of well-seasoned English oak, and is fitted with cast iron girders to carry rollers, and spindle, and fence bearings. The spindle is made of best bright iron, fitted into a superior conical-shaped bearing of gun-metal, and the girder frame is arranged for taking the spindle out without removing the casting. The fence is regulated the same side as the rack is, thus preventing stepping over the strap. A pulley is supplied on end of spindle. The head is 20ft. long, and is made of red deal and pitch pine, 11×3, and is strongly stayed with cross stretchers. The whole of the bearings for rollers are cast iron, let flush into the wood. The rollers, which are turned true out of elm, 4½ in. diameter, have spindles running through them. The table planks are pitch pine, with a rack let in each the whole length; one is 15in., and the other 13in. wide by 2½ thick. The trestles are made with oak sills and deal uprights and tops. The fence gauge is planed up true, and is made very strong, the spindle is screw-cut into a brass nut, moving the gauge ½ in. at a revolution.

With the band-saw bench such a variety of work can be done that we fail to mention any but a few, such as fencing with ornamental heads, wheel felloes, brake blocks, cutting boards, &c., &c., and when very choice wood has to be cut, by using a simple fence the band saw can be made to saw straight and take the place of the ordinary table saw bench.

Western & Co.
of Chaddesden Works, Derby, made a good display of wood-working machinery, including several band-saw machines, circular-saw benches, a very useful machine, called a "general joiner," planing and moulding machines, and a spoke and pick-handle shaping machine. A circular sawbench was driven by electricity on this stand in a very satisfactory manner, cutting with ease and regularity 11 in. deals equal to the work of any frame. The generator was placed near a steam engine, from which the power was obtained, and at some considerable distance from the bench, whilst the motor, attached to the bench, was placed beside it and connected with the generator by

underground wires. This application of electricity for sawing is admirably suited for use in conjunction with a turbine where water-power is available, as the motor can be placed at any distance from the generator without loss of power.

Chas. Powis & Co., of Millwall, London, occupied a very prominent stand with a complete and attractive show of wood-working machinery in motion, consisting of circular and band saw benches, a general joiner and estate carpenter, also an 8 h.-p. portable, a 3 h.p. vertical engine suitable for driving wood-cutting machinery. Their endless band-sawing machine, which is adapted for cutting wood into any circular, irregular, angular, or straight form. In its design special care has been taken to allow as much room as possible between the saw and framing, thus rendering the machine capable of cross-cutting wide timber.

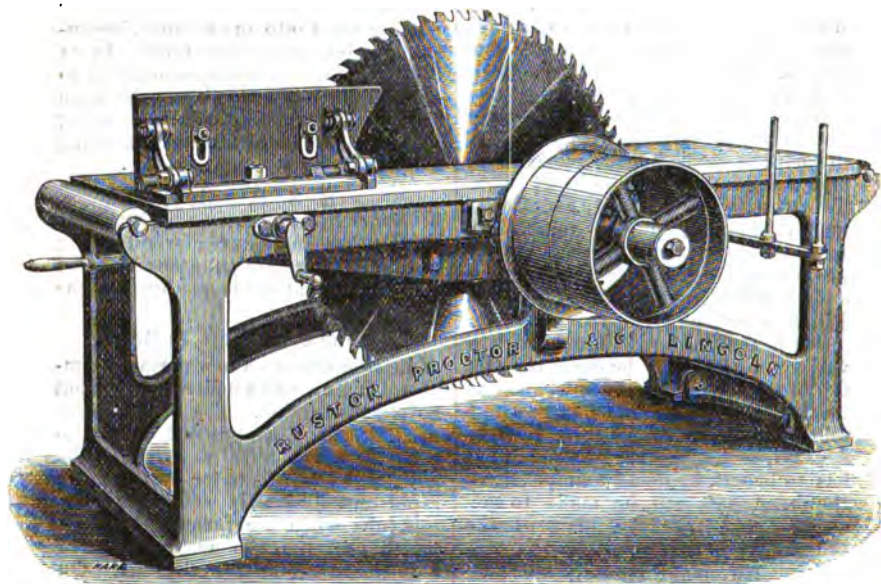
E. S. Hindley, of Bourton, has gained a high reputation for the manufacture of wood-sawing machines for estate purposes, and had on view several of his machines of the usual type.

Richard Garrett & Sons, of Leiston, showed a new portable compound engine, with a boiler of somewhat novel construction. The fire-box is of peculiar shape, and is fitted at the tube plate end with a vertical tube about 5 in. in diameter outside. A rapid circulation is established by this tube when the furnace is alight, which prevents the accumulation of cold water under the fire-box. On either side of the tube is fitted a swinging door, which, when open affords access to the fire-box end of the tubes, and when closed they form a bridge over the top of which all the products of combustion pass to the flues. When the fire is alight the draught up the chimney causes a rush of air through the tubes, which, being heated by traversing the smoke-box and boiler, meets the products of combustion coming over the bridge, and results in a mixing of the products with air and prevention of smoke. The combination of air-tubes with the bridge is apparently new, though the use of bridges and deflectors is very old.

The same firm also exhibited an improved portable saw-bench, which has the following advantages:—complete and practical portability for country use, steadiness in work, and safety for the worker by the use of Lakeman's Saw Guard, the necessity for which has long been recognised. An adjustable fence cuts parallel or bevelled work to the greatest nicety, and the general simplicity of design of this portable saw bench makes it very suitable for forest purposes.

Ruston, Proctor, and Co.,
Of the Sheaf Iron Works, Lincoln,
exhibited traction, portable, and fixed

a bed of timber, brick, or stone, which can be done by any intelligent labourer. A very efficient governor was attached, by the action of which any variation in the work on the engine instantly varies the steam supply—say the sudden action which follows the completion of a heavy cut by a circular saw, tends suddenly to increase the speed. This causes the weights to fly out by centrifugal force, and overcomes the restraint of the spiral springs. The weights carry with them the quadrant or curved lever, which is fixed to them in such a way that in altering its position it shifts the slide valve eccentric, and diminishes its



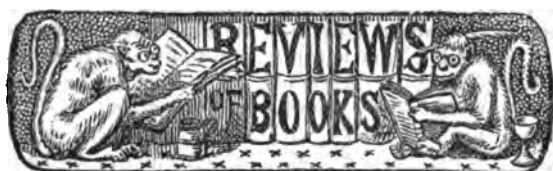
RUSTON, PROCTOR, AND CO.'S SAWBENCH.

engines and saw benches. We noticed a substantial and well-finished fixed engine, well adapted for driving sawing machinery, to which was attached the neatly-designed circular saw bench illustrated herewith, which had the appearance of a sound, well-finished machine, and admirably adapted for all farm and estate purposes.

E. R. & F. Turner,
of St. Peter's Iron Works, Ipswich, exhibited a horizontal fixed engine, called the "Gippeawyk," fitted with a patent automatic expansion governor. The engine is perfectly self-contained, and requires no attachment to the building, but merely bolting down to

stroke, thus lessening the travel of the cut-off slide valve, and reducing the steam power. When the saw cut comes again, the reverse takes place—the spring draws the weights together, the stroke of the valve is instantly increased, and the required steam supply is again obtained.

Amongst the exhibitors of steam engines for agricultural purposes, we also noticed Davey, Paxman & Co., of Colchester; Deakin, Parker & Co., of Salford; the Reading Iron Works Company Limited; Shanks & Sons, Arbroath; Fowler & Co., Leeds; Barrows and Stewart, of Banbury, &c. &c.



The Agriculture of Forfar and Kincardine. By THOMAS LAWSON. Edinburgh Publishing Company, 1881.

This little work may be best described as a carefully-written monograph, abounding in valuable hints for the practical farmer, and detailing upon almost every page something in the practice of the North British agriculturist which is worthy the attention of his southern neighbours. Plain statements of facts and reliable statistics are the leading features of the book. Its arrangement is admirable. Two well-executed maps enable the reader to refer to the various divisions into parishes, &c., the climatology, geology, topography, and agriculture of which are briefly described. Speaking of the application of lime after drainage, our author says:—"Cold late soils, under its influence, became comparatively early, barren soils became fruitful, clover-sick soils again returned to their allegiance, and that curse of the turnip crop, "finger and toe," had to turn its back on the invader. Weeds of all kinds and denominations melted under its magic influence, and were returned to the soil in the shape of manure. Accumulations of soil on headlands, old turf dykes, road scrapings, &c., all got warmed up, and spread on the fields to assist the soil in the production of its fruits."

A warning to those who, depending upon the demand of the hour, trust too much to any one kind of produce, is contained in the following sentence:—"Compared with 1855, nearly double the acreage of wheat was grown in 1856, the famine prices of the Crimean War causing a rush

to the cultivation of this cereal, for which neither soil nor climate was suitable; but 80s. a quarter was a considerable temptation, and as usual with most risky speculations a smart lesson was taught. The close of the Crimean War saw prices come tumbling down to about 35s. a quarter, the crop in many instances deficient, and in almost every case badly got, the seed of which would cost 80s. per acre, and in many cases more. . . . The result of all this is the present small acreage of wheat, which is barely one-third what it was in 1856."

One of the most valuable chapters in the book is that on turnip culture, which describes somewhat minutely the procedure in the two counties under consideration. The book also contains detailed accounts of the management of farm stock of all kinds. The "Present Position of Agriculture" is sketched with a truthfulness which will come home to most of those who are cultivating large tracts of heavy arable land, and hoping almost against hope that times will even yet right themselves, and that the British farmer will maintain his present position in the social scale.

The Journal of the Royal Agricultural Society of England. Part I. No. XXXIII. London: John Murray.

Some valuable papers and reports appear in this part of the *Journal of the Royal Agricultural Society*, although several of them are of a more learned and technical character than suits the training and education of an ordinary farmer. The first article gives an interesting "Report of Experiments on the Development of

Liver Fluke," by A. P. Thomas, Demonstrator of Anatomy, University Museum, Oxford. This is followed by a "Report on an Experimental Investigation on Anthrax and Allied Diseases," made at the Brown Institution, by Professor W. S. Greenfield, M.D., F.R.C.P., and next by a short "Report on a Series of Outbreaks of Splenic Apoplexy, on the Farm of Mr. J. R. Doggett, Holkham, Norfolk." Some very interesting remarks are made by Mr. R. H. Scott, M.A., F.R.S., Secretary of the Meteorological Society, on the recent Conference at Vienna, on "Agricultural and Forest Meteorology," and Mr. Frederick Beard, of Horton, near Canterbury, gives some excellent "Practical Experience in the Manufacture and use of Malt for feeding Purposes," which stock-feeders may study with advantage. By malting a large lot of inferior and second-rate barley, Mr. Beard finds that his stock thrives upon it, and that he effects a considerable saving in outlay for foods by its use, and believes he has his stock cheaper and better fed than could be done in any other way. This experience is corroborated in a note to the article, by Mr. James Howard, M.P., of Clapham Park, Beds. A useful and timely paper, by Sir E. C. Kerrison, Bart., Oakley Park, Scole, Suffolk, gives valuable information about a "Remedy for Foot and Mouth Disease," which he has found to be most effective in curing that troublesome complaint in stock. Sir Edward gives the following recipe and directions:—"Pour some hot water on about three table-spoonfuls of salicylic acid in an earthen vessel, adding lukewarm water to make up a gallon. The mouth and feet of the diseased animal should be carefully washed three times a day with this liquid, and the tops of the hoofs well powdered after each ablution. Also dissolve two table-spoonfuls of the acid in hot water, and add it to the drinking water of the animals. The

sheds must be kept quite clean, and all dung must be saturated with the acid to prevent further infection."

Dr. Voelcker has a couple of interesting articles on "Field Experiments on Swedish Turnips with soluble and finely-ground Phosphatic Fertilisers," and on the "Field and Feeding Experiments conducted at Woburn," on behalf of the Society. Messrs. R. Vallentine and J. W. have each a useful article on the use of Artificial Manures in growing Swedes; and two other articles are devoted to the important question of the Use and Value of certain Artificial Manures. "The Principles of Horse-Shoeing," by G. Fleming, F.R.C.V.S., should be read by all who own or use a horse. The three following subjects:—"Report on Liver-Rot," by Finlay Dun, 2, Portland Place, London; "Pigs, and Experience in their Breeding and Management," by James Howard, M.P.; and "Jersey Cattle and their Management," by John Thornton, will be read with interest by all stock-keepers.

The remainder of the part is taken up with the usual reports of the Consulting Botanist, Chemist, and various committees, and a lot of other matters of use or interest to the enterprising agriculturist.

Transactions of the Highland and Agricultural Society of Scotland.
Fourth Series, Vol. XIII. Edinburgh: W. Blackwood & Sons, 1881.

We always expect to find something both interesting and instructive in this old-established Society's *Transactions*, and the volume before us is no exception to the many that have appeared before it. It opens with a more than usually interesting description of the present state of the "Agriculture of Bute and Arran," by Archibald McNeillage, jun., Glasgow. The county of Bute comprises seven islands: Bute, Arran, Great and Little Cumbrae, Holy Island, Pladda, and Inchmarnock,

scattered over the Firth of Clyde, and presents many features of great interest to men of science, as well as rugged outlines and romantic beauty which so charm the eye of every observer, and have rendered the district famous throughout the civilized world. All these are touched on in the paper, which, however, is chiefly devoted to the primary object of Agriculture in the islands. In this, the county appears to have got abreast of the times; although somewhat late in entering the field of modern improvement, owing to the peculiar nature of the islands, and the former drawback of uncertain communication with good markets. Thanks to the introduction of steam, the islands now enjoy both rapid and regular intercourse with the best markets and towns in the country.

Another of these interesting series of articles, on the Agriculture of the counties of Scotland, follows, from the able pen of Mr. J. Macdonald, the well-known Editor of the *Irish Farmers' Gazette*. In a highly instructive report on the "Agriculture of the Counties of Forfar and Kincardine," Mr. Macdonald displays great skill and exhaustive research, by treating in detail every feature of importance bearing on the agricultural and rural prosperity of the counties, besides giving a mass of other interesting information concerning the history and general progress of the district. We strongly commend a perusal of this article by all interested in the progress of agriculture, where neither soil, climate, nor surrounding circumstances are particularly favourable to improved husbandry. The advance made, even within quite recent times, is creditable alike to the enterprise and perseverance of the landowners and farmers of the district.

In the Forestry branch of the Society's works, we have two valuable additions to the already numerous series of articles "On the Old and

Remarkable Trees of Scotland," by Robert Hutchison, Esq., of Carlowrie, for each of which he has been awarded the Gold Medal of the Society. The trees now treated of are the beech (*Fagus sylvatica*) and the oak (*Quercus pedunculata et sessiliflora*), and Mr. Hutchison discusses their history and characteristics in his usual clear and thorough manner. Every part of Scotland appears to have been ransacked for notable beeches and oaks. The amount of perseverance displayed in the collection of statistics of about 400 different "remarkable" trees scattered over the whole country, "from Maidenkirke to John o' Groats," is something remarkable in itself. The interesting information given respecting individual trees adds greatly to the value of the figures, and must have cost the author much patient research.

In the statistical table of the remarkable beeches in Scotland, we find that the tallest tree is growing at Milne Graden, Berwickshire, and measures 122 ft. in height, with a circumference of 15 ft. 9 in. at 1 ft. from the ground, and 13 ft. 7 in. at 5 ft. up. It is said to be "a very handsome tree," and grows at an altitude of 100 ft. above sea-level, on a north-east aspect; soil, light loam, resting on boulder clay. Several magnificent beeches are growing at Dunglass, in the same county, and reach from 110 ft. to 120 ft. in height, with boles from 40 ft. to 60 ft. in length, and circumference of stems at 5 ft. up, from 10 ft. to nearly 13 ft. These splendid trees grow on a sandy loam, on a freestone subsoil, and mostly on a north-east aspect, at an altitude of about 200 ft. A tree at Dalkeith Park, Midlothian, is also noted as 110 ft. high, with a circumference of stem, at 5 ft. up, of 15 ft. 3 in. In the same neighbourhood as the last is the famous Newbattle Abbey Beech, said to be the largest tree in Scotland, and certainly, from the description given of

it, a most magnificent tree. Its measurements, as given in the table, are : height 95 ft., circumference of trunk, at 1 ft. from the ground, 37 ft. 3 in. ; at 3 ft. up, 25 ft. 3 in., and at 5 ft. up, 21 ft. 2 in., with a diameter of spread of branches of 122 ft., or about 122 yards in circumference. It grows in a deep, light, sandy loam, on an open gravelly subsoil, and is in luxuriant vigour.

The history of ancient Scottish oaks is perhaps more interesting than their dimensions, and we are strongly tempted to quote in full Mr. Hutchison's deeply interesting remarks, but space forbids, and we must be content for the present with noting the sizes of a few of the largest trees. The tallest oak mentioned in the table is growing at Hopetoun, Linlithgowshire, the height of which is 110 ft., the length of the bole 93 ft., and the girth of stem 8 ft. 8 in., at 5 ft. up. This fine tree grows at an altitude of 120 ft., on a north-east aspect, in a good loam, on a gravelly clay subsoil. The dimensions of several other fine oaks at Hopetoun are given, and it is somewhat oddly remarked, "there is a cluster of oaks here, growing in the Deer Park, averaging 122 ft. in height, with clean stems of 60 ft. in length," a statement which shows that some very remarkable trees are omitted from the list. An oak 122 ft. high is not an everyday occurrence, and a cluster of them *averaging* that extraordinary height is most "remarkable." Oaks of 100 ft. or more in height are also found at Dunkeld, Perthshire, Binning Wood, Haddingtonshire, and Springwood, Roxburghshire. The oak with the greatest circumference of stem is "The Pease Tree," growing at Lee, Lanarkshire. It is 68 ft. high, and its girth, at 1 ft. from the ground, is 28 ft. 6 in. ; at 3 ft. up, 23 ft. ; at 5 ft. up, 28 ft. 6 in. "The trunk of this veteran is now quite hollow, and, at a height of about 8 ft. from the present surface of the ground, forms itself into three

branches, girthing respectively 16 ft. 8 in., 15 ft., and 11 ft. 4 in." It is said to be one of the few remaining ancient oaks, which, in the days of the Romans, formed the great Caledonian Forest. "It is satisfactory to remark that this venerable tree appears to be growing more luxuriantly than it did some years ago." The oaks of Cadzow Forest, Lanarkshire, are also magnificent old trees, of great circumference of stem, the largest being 26 ft. 7 in. in girth, at 8 ft. up, a girth considerably greater than "The Pease Tree," at the same height ; and some others approach it closely at 5 ft. up, where it still girths 22 ft. 9 in. These trees are said to be "very characteristic and picturesque representatives of the trees of Cadzow Forest."

The remaining articles in the volume, all of which are of a more or less practical nature, and will well repay perusal, are, "On the Comparative Advantages of Grazing Cattle and Sheep together or separately upon Permanent Pastures," by Duncan Clerk, writer, Oban ; "On Experiments on the Culture of Turnips," by Thomas Lawson, Sandysford, Kirriemuir ; "The Border Leicester Breed of Sheep," by David Archibald, Awa Moa, Otago, New Zealand ; "On Oyster Culture in Scotland," by W. Anderson Smith, Ledaig, Argyllshire ; and "On the economical use of Turnips as Food for Cattle and Sheep," by the Rev. John Gillespie, M.A., Mousewaid Manse, Dumfries.

An account of the Annual Show, held at Kelso in July, 1880 ; the Report for 1880, on the experimental stations, by Dr. Andrew P. Aitken, Chemist to the Society ; the Cereal and other Crops of Scotland for 1880, and Meteorology of the Year relating thereto ; and the usual Agricultural Statistics, with the *Proceedings* and official memoranda of the Society, complete a useful and well-got-up volume of more than ordinary interest.

Tree Culture in South Australia.—

By J. E. Brown, F.L.S., Conservator of Forests for the Government of South Australia. Adelaide: E. Spiller. 1881.

This excellent work, which is published under the authority of the Forest Board of South Australia, is strong proof that the science and practice of arboriculture has taken deep root in that enterprising colony, and is being wisely encouraged and developed by the Forest Board and its able staff of officials, under the direction of the experienced and skilful author of the book before us. It is just such a work as the wants of the colony require, and it has been drawn up by the author with great ability, and judicious avoidance of lengthy details, which too often only serve to land the uninitiated reader into utter confusion and disgust. Short and pithy chapters, in easily understood words, are the main features of this work. To each point, or leading subject connected with practical forestry, a chapter of the book is devoted; such as the importance of conserving forests and forming plantations; the benefits which accrue to the soil and climate from a well-regulated system of tree-planting; the commercial value of trees as a crop; and a vast amount of sound practical information as to where, when, and how to plant trees, how to treat them afterwards, how and when to thin and prune; fencing, road-making, and nursery work; and several useful lists of the trees best adapted for the various purposes of the planter; besides a comprehensive list of the trees suitable for general cultivation in the colony, with concise details of their habits, uses, and best modes of culture, and the soils upon which they will thrive best. The work is freely interspersed with numerous illustrations from the pen of J. W. Love, which are a valuable aid to a clearer understanding of the nature and

habits of the trees recommended for special purposes; and also illustrative of the various operations required in the successful rearing and management of trees. The book is printed and distributed gratuitously by the Colonial Government, and every landowner in the Australasian Colonies should get a copy, and after careful study put its excellent precepts into practice.

The Indian Forester. Edited by J. S. Gamble, M.A., F.L.S. Vol. VI., No. 4. April, 1881. Calcutta.

The number before us of our eastern Contemporary opens with a few complimentary remarks, on the changes which took place last autumn, in the management of the French Forest School at Nancy. This is followed by a portion of Mr. R. Thompson's interesting "Report on the Forests of Mauritius," in which exhaustive details are given of the present extent of forests, the laws and methods adopted for preserving and working them; the best species of trees to occupy the various soils, aspects and altitudes; and much more interesting and useful information regarding the present state and future management of the forests of that rich and beautiful island. This article should be read by all interested in the prosperity of the island of Mauritius.

A short paper on the "Rate of growth of Sâl in Chota Nagpore" comes next, and then we have a most interesting article by "Native Forester," "On the restoration of denuded forests in Kolhapur," in the Bombay Presidency. This Native State contains an area of about 300 square miles, and is chiefly situated on the eastern slopes of the western Ghats. The mountains have been sadly denuded of their former clothing of trees, by reckless cutting down of the forests and jungle and burning them for *kumri* cultivation, a system of culture that has been peculiarly

destructive to the original vegetation in many parts of India. To prevent any further waste, and to reclothe with trees a portion of the naked slopes of the hills, the native Government have instituted a Forest Department, and appointed a staff of native officials, who appear to have been tolerably successful in carrying out the object in view, during the three years since the Department was created.

A clever and amusing article, entitled, "An Apology for Salai" (*Boswellia thurifera*) will repay the reader's perusal; "Jhand Coppice;" "The destruction of Eucalyptus at Changa Manga," by white ants eating away the roots after the trees had attained a height of about 60 feet, and a proportionate diameter of stem; and a noteworthy communication from Mr. A. Smythies, on the flowering of the large bamboos (*Bambusa arundinacea*), at Dehra Dun, this year, complete the original articles in this part.

Extracts from official papers and the public journals occupy a considerable portion of the remainder of the part, and among the somewhat lengthy "Reviews," the *Journal of Forestry and Estate Management* receives the usual crabbed criticism, the bigoted spirit of which the copious extracts made by the editor do not confirm. It is satisfactory to those connected with the *Journal*, that their views are thus unintentionally endorsed, and will undoubtedly prevail in the near future. The antiquated notion that every detail of forestry cannot be efficiently taught in Britain, is believed in only by those few whose obfuscated ideas have not yet had light let in upon them.

The Florist and Pomologist.—The June number contains a description with illustration of a beautiful variety of *Rhododendron* termed the "James Marshall Brooks," originating from the Knap Hill Nursery, and which challenges

precedence with any other ornamental evergreen flowering shrub in existence. A list is given of the finer sorts of *Rhododendrons* which have stood the severe trials of the past two winters unharmed, and which are recommended both for hardiness and beauty. The other coloured plate represents a fine specimen of the Pershore Plum, a variety of no ordinary importance, and one that is being cultivated to an increasing extent every year for market purposes. Its great merit consists in the fact that it rarely misses a crop, and even during the past three or four bad plum seasons, a plentiful crop of the Pershore has been secured.

OUR FOREIGN EXCHANGES.

IN last issue it was stated that there had been received from Prof. Dr. Hess, of the University of Giessen, the programme of the course of studies in Forest Science to be followed in that university, from Easter, 1881, to Easter, 1882. Such programmes are published in many, if not in all, of the schools of forestry on the Continent, giving details of the hours and days of each meeting of each class throughout each session of the period embraced by the course, with the names of the professors officiating on each occasion.

Since then there has been received a memorial volume by Dr. Hess, entitled, *Der Forstwissenschaftliche Unterricht an der Universität Giessen in Vergangenheit und Gegenwart*. The University of Giessen has become known to agriculturists in Britain as the university where Liebig prosecuted his researches and published his observations. It was the first university into which was introduced the study of Forest Science. Dr. Hess divides the past history of this study into the first period of University Instruction in Forest Science, in connection with political economy,

comprising from 1788 to 1824; the second period, in which it was taught in a special School of Forestry from 1825 to 1831; the third period, that of the new forest university instruction from 1831 to 1881. There are given details of the existing arrangements for the study of forestry; of the expense of this organization, and the instruction imparted; and of the duties of the teachers, with tabulated statements of the nationalities of the students in each session, since 1825 to the present time, and of the college attendance and present professional position of all surviving students.

In the *Nuova Rivista Forestale* of Italy is a paper on some maladies and injuries to which certain forest trees are subject; and from Vienna has been received a German translation of a valuable treatise by the editor of the *Rivista*, Professor Chevalier Francesco Piccioli, Director of the Forest Institute of Vallombrosa, entitled *Elementi di calcolo alle differenze finite in ispeciale applicazione alla Scienza Forestale*. In vol. iv. of the *Journal of Forestry*, pp. 743—745, 816—818, is a notice of *Elementi de Tassazione ed Assessmento Forestale*, by the same author, and in vol. ii. p. 749, is noticed the work now referred to. The two may be considered the complements of each other.

From Vienna has also been received a reprint from the *Mittheilungen aus dem Forst. Versuchswesen Oesterreichs*, of a report entitled *Einfluss der Harzung auf Wachsthum und Holz der Schwarzeföhne*, by Forstrath Dr. Nördlinger, formerly of the Royal Wurtemberg Academy, of Land and Forest Scenery at Hohenheim, now of Tübingen.

Some two years since, in 1879, there was published a treatise, entitled *Le Chêne-Liege en Algérie*, par M. A. Lamey, Inspecteur des Forêts (a treatise on the Cork Tree in Algeria). In the Spanish *Revista de Montes* for July is a critical

review by Don Primitivo Artega, of views advanced in this work, with much additional information, confirmatory of these, or modifying general statements when necessary; and in the same number is a copy of the Royal order for the publication of *La Forestal Espanola*, by Sr. Laguna, a work for the publication of which there has long been an urgent call by the students of Forest Science in Spain.

In *L'Echo Forestier* is given the following account of a new process for the preservation of laths and timber, known as the Hatzfeld system. Hitherto two methods of preserving wood by injection have generally been followed, the injection of sulphate of copper, and the injection of creosote.

The former is employed for the preservation of telegraph posts; but it cannot be reckoned effective for more than six or seven years, and sometimes in three or four years it becomes necessary to replace posts thus treated.

This result may be attributable to the sulphate of copper (blue vitriol) being soluble, or to this salt being in calcareous soils decomposed, through the action of carbonate of lime disengaging carbonic acid, and its not remaining as sulphate of copper in the wood.

As for the creosote, it is caused to penetrate the wood by injection in closed chambers, at a temperature of from 50° to 60° Cent. = 122°—148° Fahr.; to render it more fluid and being very inflammable, the employment of it is dangerous. This mode of treatment is, moreover, very costly, in consequence of the high price of creosote and were the employment of it to become general, this inconvenience would be considerably increased.

The substance employed in the new method, that of M. Hatzfeld, of Nancy, is the tannate of peroxide of iron; but it is exceedingly hard and insoluble, and the question arises,

how can a substance which is not liquid be applied? This is done by a very ingenious device.

The tannate of protoxide, which is soluble, absorbs oxygen with great energy when in contact with the air, and transforms itself quickly into the insoluble tannate of peroxide. It is then sufficient to inject into the wood a solution of the tannate of protoxide of iron to obtain the desired result.

In practice the operation is double, 1st, an injection of tannic acid, a solution of extract of chestnut wood; 2nd, an injection of a protoxide of iron. There is employed for this purpose the pyrolignite, which combines, with the advantage of being of little cost, that of not attacking in any way the fibres of the wood.

The injection is made in a close

vessel. The apparatus is the same as is used for creosote and the process is similar: so the cost of the two methods varies but little, and only through the difference of price of the materials employed.

This method has been applied for some years to different timbers in the structure of platforms for cannons, in the cross-beams and wood-work of the waggons of the *Railway Compagnie d'Est*, and the stanchions of mines, and other timbers furnished by the *Compagnie d'Anzin*.

From Denmark has been received the fifth volume of the *Tidsskrift for Skovsborg*, entirely occupied with a report of statistics of Danish Forestry, by the editor, Dr. P. A. Müllder, Professor of Forest Science in the Agricultural College of Copenhagen.

JOHN C. BROWN.



ERRATA.—In Mr. D. McCorquodale's letter headed "Price of Forest Produce," &c., in last month's *Journal*, at the top of page 208, the word "slabs" should have been "staves"; also in letter, "Natural and Transplanted Larch," foot of page 209, for "expect an annual to thrive," read, "expect an animal to thrive."

OBITUARY.—Mr. Rowland Ward Delves, of Hargate Lodge, Tunbridge Wells, died recently in his 30th year. He had been in failing health for some time, and last year a voyage to Australia was advised by his medical attendants. The deceased gentleman has for thirteen years assisted his father, Mr. William Delves, in the management of Lord Abergavenny's estates, and he will be long remembered for his high character, excellent business habits, and gentlemanly demeanour.

FERNS PROPAGATED BY CUTTINGS.—

Is it generally known that ferns may be propagated from cuttings of the fronds? At the instance of an acquaintance we made the experiment with about three inches of a bipinnate frond. The pinnæ of one side were cut off, the rib laid lengthwise, with its extremities a little deeper in the soil, and an inverted tumbler put over it to keep it moist. In a short time small fronds were developed from the base of the remaining pinnæ.—*Farmer*.

MEN AND TREES.—In one of her best works, George Eliot remarks it is with men as with trees. If you lop off their finest branches into which they were pouring their young life-juice, the wounds will be healed over with some rough boss, some odd excrescence, and what might have been a grand tree, expanding into liberal shades, is a whimsical, misshapen

trunk. Many an irritating fault, many an unlovely oddity, has come of a heart-sorrow which has crushed and maimed the nature just when it was expanding into plenteous beauty, and the erring life which we visit with our harsh blame, may be but as the unsteady motion of a man whose best limb is withered.

THE WHITE BEAM.—At midsummer one common fault in English scenery is the too monotonous tone of green. Of course a judicious landscape gardener who has a competent knowledge of the resources at his command will know how to obviate this, but the process is often slow and expensive, but by the use of the White Beam (*Pyrus aria*), both difficulties may be got over. Though a native tree it is not seen so often as its merits demand. The common white poplar is another cheap and effective tree that might be used with advantage.—*Gardeners' Chronicle*.

A TREE STRUCK BY LIGHTNING.—In the course of the late thunder-storm a large tree at Ruthven, upwards of a hundred years old, was struck by the electric fluid and shivered into fragments. One large branch, as big as an ordinary tree, was thrown with great violence a distance of some fifty or sixty yards. It was fortunate there was no person nor any animal near at the time, for they could scarcely have escaped.

NOTABLE TREES IN PERTHSHIRE.—Two trees, which many a traveller must have very much admired, grow on the banks of the Tay below Dunkeld. One of them is an oak, the other a sycamore, and they are said to be the last remaining trees of Birnam Wood. The oak stands 25 yards from the stream into which its roots dip and feed. The trunk is 18 ft. in circumference at 5 ft. in height, and a great head of numerous branches rises from the crown at 14 ft. from the ground. The sycamore is 18 ft. 10 in. in circumference, and its trunk is 72 ft. high. It has a grand head.

THE LARGE FIRES AT WOOLMER FOREST, alluded to in the *Gardeners' Chronicle* (June 4), proved very destructive to animal life. Hundreds of hares, rabbits, game of various kinds, and numberless little song birds perished in the flames. I was fortunately too far distant to hear the cries uttered by the hares and

rabbits as the fire encircled them, but I saw the flames near Warren's Hill and Lea's Enclosure very plainly, as they played round the tall pine trees, destroying every vestige of vegetation in their rapid course. Several foxes were found dead, having been suffocated by the smoke, and it is supposed that a great many young cubs were destroyed; but Reynard fared better than his usual victims, for a great many foxes emigrated to the neighbourhood of Hadley Wood, where they committed great havoc in different poultry yards in the nights following the fires.—*H. E. W.*

OAK APPLES ON THE TRUNKS OF OAK TREES.—Have any of your readers ever noticed the above fact? I saw several last Wednesday growing on young oak trees of about 18 in. in diameter within a foot of the ground. How profusely the hawthorn seems to blossom this season. The first sprig I noticed in bloom this year was on May 14; horse chestnut May 11, both within a few hundred yards of the sea, on the Dorset coast. Yesterday I found wild sage in blossom, and also with the seeds nearly hard. Water blinks in full flower, if it can be called such, on May 20.—*M. C. H. B.* (Weymouth), in *Land and Water*.

THE CUCKOO.—Last autumn, a young cuckoo was taken at Westbourne, and carefully cherished during the past severe winter. It was allowed to fly about in an open hall, and has become so tame that it will perch on the finger and permit itself to be stroked. It will also occasionally sit on a cat's back. It is fond of boiled egg, and delights in the caterpillars of the "woolly bear." Jenyns observes that the orbits of the mature bird are orange-yellow; these are of a pale citron. The irides, as he describes them, are at present liver brown. Its cuckoo cry has not yet been heard.—*Farmer*.

CONIFERS AT DROPMORE.—One of the richest Pinetums in this country, as most people know, is that at Dropmore. It contains specimens of some trees unequalled elsewhere in England. *Abies Douglasii* is admitted to be the finest tree of its kind even in Europe. It is considerably more than 120 ft. in height, with a stem in proportion, and it is thickly studded with wide-

spreading branches from top to bottom. It is evident that another important conifer here is the *Araucaria imbricata*, a perfect specimen of what a tree should be—symmetrical and clothed to the ground with branches. It also possesses that graceful habit, peculiar to its kind, when of sufficient age and in sufficiently good health.—*Garden.*

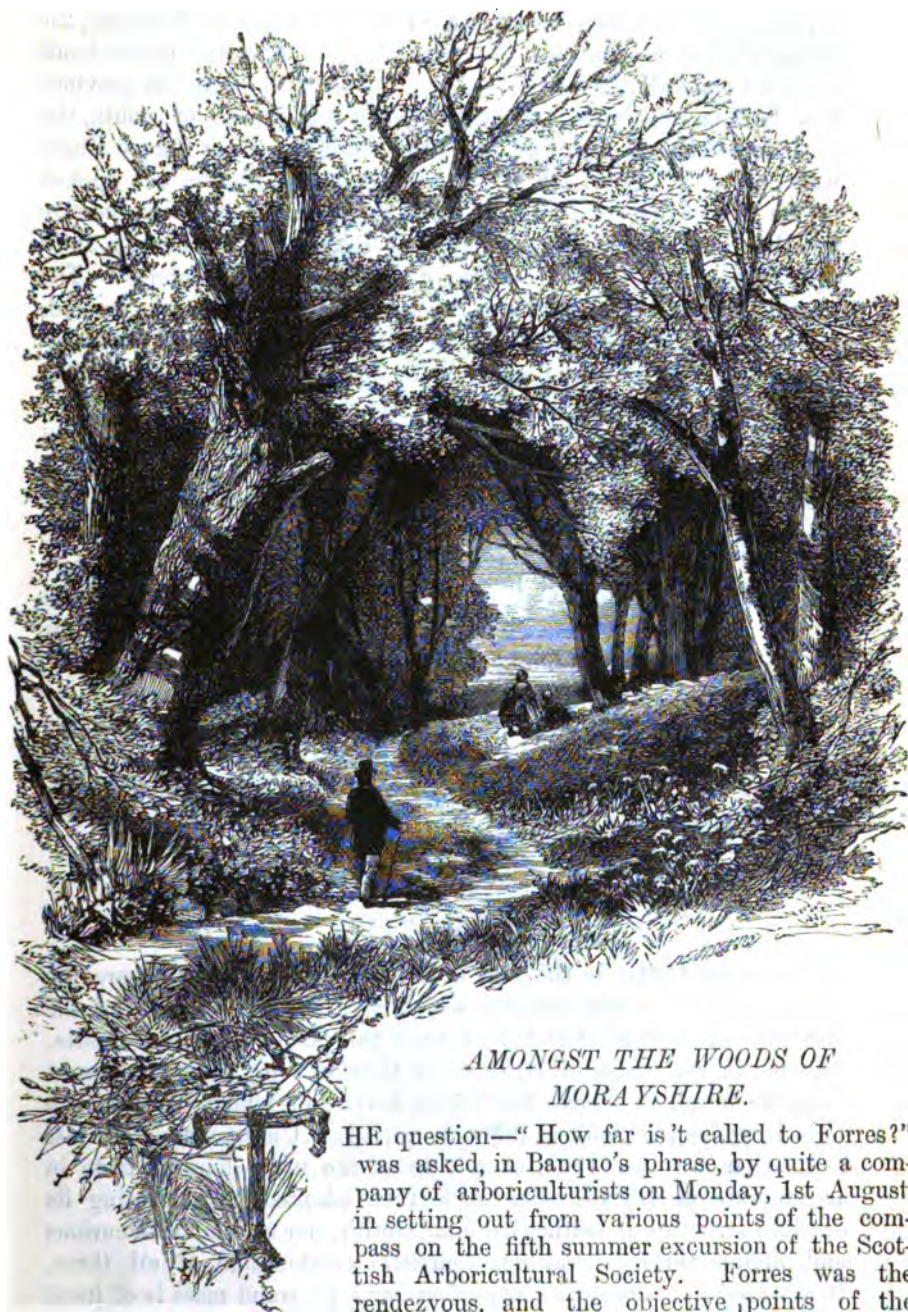
REMOVAL OF A LARGE PURPLE BEECH.—Mr. Barron, of the Elvaston Nurseries, Borrowash, removed a noble purple beech last October, when in full leaf, at Maresfield Park, Sussex, the seat of Lady Shelley. The tree, which weighed over fifty tons, was carried over a sunk fence, from the garden in front of the mansion, into the park, a distance of about 200 yards. The height of the tree is over 50 ft.; circumference of trunk, 9 ft. 8 in.; diameter of branches from north to south, 52 ft. 6 in., and from east to west, 46 ft. The square mass of soil and roots removed was 16 ft. by 16 ft., and 3 to 4 ft. deep. The tree has withstood the winter gales with impunity.—*Land and Water.*

FORCE OF A LIGHTNING FLASH.—The following remarkable effect of lightning, which, by a gentleman who personally examined it, has just been communicated to me, may probably be of considerable interest to many of our readers:—In the short lightning storm which occurred on the afternoon of June 6th (Whit-Monday), the electric fluid fell upon a magnificent oak with gigantic drooping arms, having an unusually wide spread, near to Cranbrook, in Kent, and behind its stroke left nothing standing save a bare shattered cone of about ten or eleven feet high, lightning-carved into a rude spiral form. After having thus reduced the noble tree to fragments, the fluid appears to have shot into the earth along one huge fibre of the root, around which the ground was so thoroughly torn up that the fibre, being set free, could be moved to and fro with slight pressure. The remnant of the white and blasted cone, through the rents of which my informant was able to look, roughly measured, is about four feet from the ground, seemed in diameter about equal to the length of his umbrella, and its splinters were scattered near and far. Strange to say, the enormous branches

which lay prostrate around were all shattered and splintered in the same way, and nearly as effectually as the tree's trunk; and three men, who, at some distance from the catastrophe, had taken shelter from the rain under a hedge of the field in which the tree stood, report that they had the splinters sent flying over their heads.—W. R. A., in the *English Mechanic.*

THE OAK CATERPILLARS.—Mr. Geo. Berry, of Longleat, Wilts, writing to *Garden*, says, that these are so numerous this season that scores, ay, hundreds, of oak trees are just now almost quite denuded of leaves. The caterpillars are believed to be *Biston hirtaria*, *Cerastis vaccini*, and *Tortrix viridana*. I have seen extensive tracts of woods in the north of England and in the Midland counties at this time of the year almost bare of foliage through the ravages of this oak-leaf eating caterpillar. I do not remember the oak trees here presenting so miserable an appearance. The oak woods proper on the clay lands are those so attacked; the oak trees in the upper woods on the greensand are almost free from the caterpillar. Probably we have had these oak-eating species in the woods as numerous other seasons. The reason I attribute to their playing such havoc this season is on account of the scarcity of starlings, through so many dying last winter from hunger. In former seasons the oak woods at this time of year, during the day, were all alive with flocks of starlings flitting from tree to tree, keeping up a regular chatter, but at the same time hard at work eating caterpillars; whereas, the woods are perfectly quiet this year, and hardly a starling is to be seen. The caterpillars therefore seem to have it all their own way, there being no natural enemy to keep them in check. The little copse in the hangings of the downs are the favourite roosting-places of the starling. Thousands of them used to congregate in the summer evenings in the high trees around here before taking their flight to the downs. This season I have not seen any in their usual places of resort. I hope the few that are spared will have a good breeding season and soon become plentiful again, for I believe it to be the most valuable bird that we have as an insect destroyer, and one that does the least harm to garden or field produce.

THE JOURNAL OF
FORESTRY & ESTATE MANAGEMENT.



*AMONGST THE WOODS OF
MORAYSHIRE.*

HE question—"How far is't called to Forres?" was asked, in Banquo's phrase, by quite a company of arboriculturists on Monday, 1st August, in setting out from various points of the compass on the fifth summer excursion of the Scottish Arboricultural Society. Forres was the rendezvous, and the objective points of the

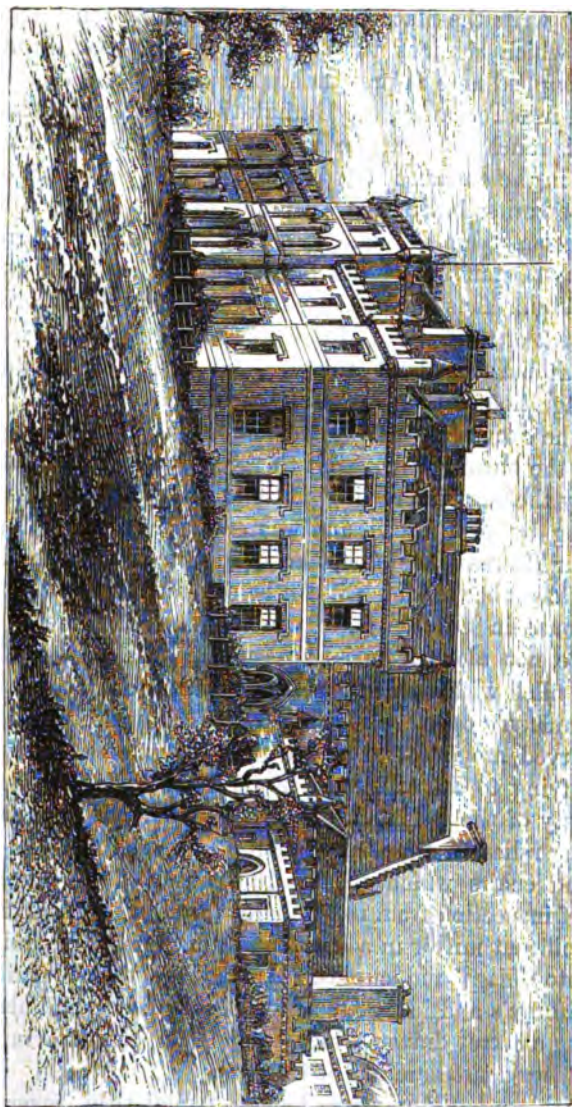
expedition were the woods of Altyre, the forest of Darnaway, and the leafy glades of Brodie and Dalvey. Unless to those thoroughly conversant with the forest treasures of the far north of Scotland, the exploitation of the county of Moray in search of novelties in woodcraft seemed a somewhat risky proceeding; but those to whom the province was familiar, either from the delightful experiences of youth, the sober researches of manhood, or as the result of earnest library study, were quite prepared for the enthusiastic admiration, the almost boyish glee of the uninitiated at the unfolding of each new successive woodland beauty, during a couple of long days' wanderings in a district so replete with historic and arboricultural interest. The weather, so uncertain and bleak of late, was all that could be desired, a cool northerly wind rendering the peregrinations through the woodlands redolent with the subtlest odours, most delightful. With agreeable companionship and admirable guides, as anxious as they were able to afford every information regarding the neighbourhood and its plantations, the excursion was in every respect successful, not to say instructive. Upwards of forty members of the society, representing the principal landowners of England and Scotland, were present during both days, and if anything were needed to complete the thorough enjoyment of the fortunate visitors to forest scenes unique in many respects, it was the unbounded hospitality of Sir Wm. Gordon Gordon-Cumming, Bart., of Altyre, and the Earl of Moray, of Darnaway Castle.

It is not our present purpose to follow in the footsteps of the members of the Arboricultural Society during their two days' wanderings, but to take a general survey of the properties visited, glancing here and there at the arboricultural notabilities.

DARNAWAY.

Darnaway Castle is the seat of the Earls of Moray. There are few properties in this country which give one a better idea of the residence of a great feudal lord than this same Darnaway Castle. Situated in the parish of Dyke, some three or four miles south-west from the burgh of Forres, the Castle, a view of which we give, is a huge irregular pile built at different periods. Unfortunately the last restoration was in 1806, at a date of the most debased taste in architecture in Britain. The style then adopted in renovating its outward structure is neither baronial, Gothic, nor classic, but a curious and, architecturally speaking, unartistic combination of all three. It is withal not without its attractions, and its grand mass is of itself imposing when seen rising above the forest from many parts of the

DARNAWAY CASTLE, SEAT OF THE EARL OF MORAY.



upper reaches of the Findhorn. A finer situation could not easily be chosen. The building crowns a beautiful green eminence, with an open-tree embellished park stretching for some distance around; while on every other side the great forest of Darnaway completely encircles this famous hunting seat of the celebrated Regent Moray. In ancient writs the place is called Tarnua, from the Gaelic Taran or Tarnach, which signifies thunder, probably because Jupiter Taranis was worshipped here in pre-Christian eras. In the middle ages it was corrupted into Ternaway, the Darnaway of the present time.

There is much to attract in the interior of the fine mansion. For instance, in the entrance hall there is a fine collection of historical family portraits, beginning with the Regent Moray; and in the drawing-room there is Vandyke's celebrated and very grand picture of Charles I., standing beside his horse, and attended by the Duke of Hamilton. This picture originally hung in Donnibristle Castle, another seat of the Earls of Moray on the shores of the Firth of Forth, which was burned about thirty years ago. A workman during the conflagration, with great presence of mind, took his pocket-knife and cut the canvas from its frame, and rolling it up, brought it safely out from the burning pile. But the great "Randolph's Hall" is undoubtedly the most interesting portion of the Castle. This chamber is 90 ft. long by 36 ft. broad, and was erected some six hundred years ago by Sir Thomas Randolph, Earl of Moray, after whom it is named. The only chamber to which it can be compared in Scotland is Parliament House in Edinburgh, to which indeed it bears a striking resemblance, not alone from its size, style, and decoration, its lancet windows filled with stained glass, its beautiful oak floor, but above all its magnificent open oak roof. These exquisitely poised beams, boldly carved, are as sound as the day they were fixed six centuries ago, testifying to the excellence of the oak of Tarnua Forest, and to the honesty of the workmanship of a by-gone age. There are many interesting relics in the ancient hall. For instance, the banqueting tables and chairs which occupy the centre of the great room are worthy of inspection from their quaint form and free carving. There is a magnificent mirror in a boxwood frame, elegantly and artistically carved into foliage and cupids. Among the other furniture are the Regent Moray's and Mary Queen of Scots' chairs, and also a cabinet containing a secret drawer which belonged to the unfortunate Queen, who held her court here in 1564.

The earldom of Moray was long a feudal title, reverting to the Crown in default of male issue. The first Earl was Angus, Comes de Moravia, in 1130, said to be a descendant of King Duncan. Then early in the thirteenth century there was Sir Thomas Randolph, Earl of Moray, the builder of Randolph's Hall, and witness of many of the

charters in the time of William the Lion. His son, Sir Thomas, was Lord Chamberlain to King Robert the Bruce, and married the King's sister. The earldom in this family became extinct on the death of Earl John at the Battle of Durham in 1346. Down to 1500 the earldom was granted in succession to the Earls of March and Douglas, but in 1501 James Stewart, the natural son of King James IV., was created Earl of Moray. He died without issue, and in 1562 the title and estates were conferred upon James Stewart, natural son of James V. He is better known as the Regent Moray,³ and was half-brother to Mary Queen of Scots. His eldest daughter, Elizabeth, married James Stewart, or Stuart, Lord Doune, a descendant of Robert, Duke of Albany, and third son of King Robert II., and from this union the present family of Stuart, Earls of Moray, are descended.

Originally built as a hunting seat, it is but natural to suppose that there have been forests in the neighbourhood of Darnaway for many centuries. As a matter of fact the woods here have been celebrated for generations, and few estates in the country can boast such an expanse of splendid full-grown timber. The oak forest of Darnaway is acknowledged to be the finest in Scotland, and there are few which can compare with it anywhere in the British Isles. For over a century the oak produce from this forest, which is 3,000 acres in extent, has attracted attention all over the north of Scotland, and ship-builders and wheelwrights from all parts annually attend the sales, assured of the quality and size of the timber. As early as the latter years of last century the thinnings brought as much as £1,000 per annum, and between 1830 and 1840 the sales of timber and bark ranged from £4,000 to £5,000 yearly. Owing to the low price both of wood and bark we believe that not so much has been cut lately as in former years; yet Mr. Grigor alleges that "after paying every expense during the growth of the timber, the revenue of the forest per acre was double that of the finest arable land in the country." Some idea of the extent of the forest, including the oak and the pine woods and plantations, may be gathered from the fact that in order to make a tour through them a walk of twenty-six miles has to be indulged in. To do full justice to this grand Forest of Darnaway, with its varied surface, its beautiful glades, its sunny openings, its fertile clearings, its grand rides, in which the foot sinks into the softest carpet of dry moss, its solemn aisles between long colonnades of nature's own heaven-stretching pillars, would occupy a volume and involve a disquisition upon the history of the most prominent forest trees indigenous to or introduced into the country. In our hurried run through the forest we were only able to overtake some of the more interesting sections, and we shall give a few of the measurements as they were made at different points.

To the right of the castle there are two larch trees planted by the aunts of the present Earl. The largest is over 100 ft. high, and girths 10 ft. 1 in. a foot from the ground. In front of the castle there is an elm 90 ft. high, 14 ft. 10 in. in circumference at one foot and 12 ft. 6 in. at five feet. There was, however, no



ASH AT EARLSMILL.

time to examine carefully what may be termed the "policy" woods, and we hurried on to Earlsmill to visit the famous ash tree there. In 1830 Sir Thomas Dick Lauder thus wrote regarding this tree, which had been quoted so far back as 1789 by Dr. Walker, Professor

of Natural History in Edinburgh University, as one of the most remarkable trees in the country :—"This noble ash is one of the most magnificent trees as to form we ever beheld. The tree measures above 17 ft. in girth at three feet from the ground, but it spreads out so much below that its measurement would be much greater if taken lower down. There is a small hole at the root of it, large enough to admit one man at a time, and on creeping into it the cavity is found to be so great as to allow three people to stand upright in it at the



BEECH AT EARLSMILL.

same moment. The interior has been in this state during the memory of the oldest persons, and yet until an accident in July, 1824, nothing could be more grand than its head, which was formed of three enormous limbs, variously subdivided in bold sweeping lines. The foliage, though appearing late, was, and indeed still is, abundant and beautiful. But some days before the 23rd of July, 1824, its great southern limb was broken down by a high wind, and although the ruin thus created was sufficiently deplorable, yet it was strikingly

sublime." In the year of grace 1881, this giant is still a magnificent tree, full of fresh green foliage, and despite the ruin spoken of by Sir Thomas fifty years ago, it to all appearance may survive for centuries. It is 20 ft. 6 in. in circumference a foot from the ground, and 18 ft. 4 in. five feet up, so that it has grown to a very considerable degree since it was measured by the enthusiastic baronet of Grange. For instance, it is now sixteen inches greater in circumference at five feet than it was at three feet in 1830. This may be accounted for by the fact that a root shoot has sprung up, and growing into the trunk of the tree has swollen its girth and added new vigour to its top. Near the ash there is a beech which, though unfortunately growing by a brook-side at the bottom of a bank, which somewhat hides its noble proportions and great size, is perhaps a grander tree than the ash, even when the latter was in its heyday. This beech is 65 ft. high, with a bole of 20 ft., so equally grown that it girths perhaps as much at fifteen feet from the ground as at five feet. The circumference at one foot up is 18 ft., and at five feet up 16 ft. 7 in. It had grown four inches in two years, when Mr. Scott, the skilled forest superintendent of Darnaway, last measured it. Mr. Grigor quotes the tree in his "*Arboriculture*," and speaks of it as measuring 60 ft. high, with a trunk 16 ft. in circumference at four feet from the ground. It is possessed of about a dozen limbs, each as large as ordinary trees. Another companion to the ash is a very handsome elm, girthing 15 ft. 4 in. at one foot, and 14 ft. at five feet from the ground.

Having made a detour to inspect these grand specimens we return to the forest by the west approach. Plunging into the depths of the forest, we are more impressed with its grandeur and value the deeper we penetrate. On a rising ground forming the centre of a little clearing, we are arrested by an oak of the goodliest proportions and the shapeliest form. It has a clean stem of 15 ft. and a spread of branches of 80 ft., while it girths 11 ft. 6 in. one foot from the ground, and 9 ft. 3 in. five feet up. From this section of the forest we are taken to the bark-drying sheds and stores, the economy and efficiency of which has been admirably described by Mr. Grigor in his work "*Arboriculture*," and therefore need not here be dilated upon. Here are also situated several neat and comfortable-looking cottages for the workmen employed in the forest, an excellent lodge for the young foresters, commodious stabling for the horses, and well-arranged stores, tool sheds, and other conveniences, with a full stock of all the necessary tools and implements employed in the working of the forest, all the best of their kind, and kept in first-rate order. Among other useful and powerful implements which specially attracted the attention of the party, were a well-built timber carriage, specially adapted for removing heavy and lengthy trees; some

powerful timber jankers and wood-carts, an immensely weighty hollow iron road-roller, fitted with turn-table shafts for two or more horses, and which, when filled with water, must weigh many tons; besides many other useful implements of the best design. In the wood yard our attention was attracted to several sections of an elm recently cut up, and curiosity tempted us to count the annular rings, which number 201. Measured in one direction the section was 3 ft. 6 in. in diameter, and in another direction 3 ft. 10 in. And it was deeply interesting to note that had we been possessed of the date of felling of this fine trunk, we might have gone over the annular rings and made a very good guess as to the prevailing character of the weather in each of the two hundred years of its growth. From this we made our way past Mr. Scott's neat-looking residence, standing in the midst of a well-kept and full-cropped garden, to the clean and well-managed kitchen garden, some eight acres in extent, with its fine old herbaceous border, to another part of the forest bordering the Findhorn, known as Ladendich. Scots firs are here plentifully besprinkled among the oaks, and among those we measure are one 9 ft. 2 in. in girth five feet from the ground, and containing 107 cubic ft. of timber; a second girthing 10 ft. 8 in. at one foot, and 9 ft. 8 in. at five feet from the earth; a third was 97 ft. high with a bole of 6 ft. when it forks into two enormous limbs. The circumference at a foot from the ground was 15 ft., and the cubic contents of the tree are $287\frac{1}{2}$ ft. A fourth possessed a curious bend of the head about 80 ft. up, with very smooth bark. It had a bole of 40 ft. of clean timber, and girthed 13 ft. 9 in. one foot from the ground, and 10 ft. 6 in. five feet up. Along the banks of the noble Findhorn there are among other trees in the natural woods some grand specimens of the holly. The best of these will measure about 50 ft. high, with boles from 2 ft. to 2 ft. 6 in. in diameter. Indeed, so plentiful was the holly in the Forest of Darnaway, that for many decades the castle was supplied with no other fuel than billets of holly, and yet they are so numerous that in going through the woods now, no one would suppose that any such extravagance had ever been committed. Another natural tree which commands attention from its abundance in these woods is the bird cherry (*Cerasus padus*), which grows to 50 and 60 ft. in height, and attains a girth of 7 to 8 ft.

Descending from the somewhat steep banks or cliffs of the Findhorn, to what is known as St. John's Mead, or the Haugh of Logie, we come upon the remains of a grand oak plantation. At the end of a long stretch of level sward, where tournaments were wont to be held long ago, we find growing by the river-side oaks of enormous dimensions, some rising from their own roots and some from stools. A few we

measured with the following results :—No. 1 had a spread of branches of 75 ft., with a clean bole of 23 ft., which alone had 168 cubic ft. of timber. It girthed 13 ft. 9 in. at one foot, and 11 ft. 5 in. five feet up, and contained in all 190 cubic ft. of timber. No. 2 was 22 ft. in circumference one foot from the ground, but had an irregular gnarled stem. No. 3 was 27 ft. 9 in. in girth a foot up, and girthed 20 ft. 5 in. at five feet up. No. 4, 20 ft. 6 in. No. 5, 20 ft. 5 in. No. 6, 18 ft. 8 in. No. 7, 17 ft. 1 in. No. 8, 16 ft. No. 9, 14 ft. This grove, previous to the great floods of 1829, contained the finest oaks in Scotland, according to Sir Thomas Dick Lauder, and on that occasion many of the trees growing nearest the river were washed away. At the foot of a precipitous bank on the other side of the Haugh is a grand Spanish chestnut, the bole of which contains 208 cubic ft. of timber, while the whole tree is estimated to contain 400 cubic ft. It girths 17 ft. 3 in. at a foot from the ground, and 15 ft. at five feet up, and it has grown two feet in circumference in two years. Close beside this magnificent tree is a larch over 100 ft. high, and containing 240 cubic ft. of timber. And a little to the right on the verge of the wood is seen towering high above the surrounding forest one of the highest trees about Darnaway—a larch over 130 ft. high, but of which time did not permit us to measure the girth.

Barely enough has been said to give even a faint idea of the great extent and variety of the arboricultural features and points of interest about Darnaway Forest, because the time at the disposal of the party was quite insufficient to explore any but the most accessible parts, and the whole of the natural and planted pine woods, some thousands of acres in extent, had of necessity to be omitted from the day's programme. This was the more to be regretted, as these woods, which we inspected a few days afterwards, exhibit many points in their management of special importance to the practical forester, particularly the method adopted for the clearing and renewal of the natural pine forest. The system followed is to clear away the mature forest, leaving only sufficient standards to seed the ground properly in a natural way, and planting only the parts where the natural sown seed fails to grow. This is undoubtedly the best method, as well as the most economical, for the management and reproduction of forests, and is most successfully carried out at Darnaway. The pine plantations also show excellent management, and a great extent of them have now attained a size at which the thinnings are of much use, and the timber of excellent quality. The larch plantations, which are also of considerable extent, are in a very thriving state, and are mostly on the steep slopes near the Findhorn, the finest perhaps being in the Sluie plantations where many are found from 100 to 120 ft. high, straight as an arrow, and girthing 7 to 8 ft. at 5 ft. up.

Any account of Darnaway would be bald which left unnoticed the heronry so long associated with the Forest, and reckoned the largest and most complete association in the North of Scotland of this stately bird. Unfortunately, from some cause or other which naturalists have been unable to explain, the herons have lately deserted their ancient resting-place, though they have not altogether forsaken the locality and still continue to breed on the banks of the Findhorn. Sir Thomas Dick Lauder, in describing the old Darnaway heronry, thus spoke of it :—“The rocks on the river at the place where the herons have established themselves are of the floetz formation. On the left bank the under strata rise abruptly over the bed of the stream, while the upper strata recede from it so as to form a broad piece of plain. On the rock immediately over the river some venerable old oaks of great height rise from among the smaller wood which everywhere clusters along the bank; on the elevated heads of these trees the greater number of the herons have established their nests, whilst the rocks which rise in perpendicular cliffs to an immense height on the opposite side of the river, including the whole of the existing strata, have here and there a nest adhering to some prominent shelf. So far as we can learn, there is reason to believe that this heronry has existed upon these trees and upon their predecessors, and upon the rocks in their neighbourhood, for ages. The neighbouring proprietors are zealous for its preservation, and no one is allowed to injure or to alarm the birds whilst occupied in rearing their young. The only enemies they have are the mischievous jackdaws who build in the crevices of the cliffs. These nimble little birds no sooner perceive that a heron has quitted her nest than they dart into it and carry off an egg; and nothing can be more ludicrous than the attempts made by the unwieldy herons to pursue their enemies and to recover their eggs or to punish the depredators. The heron was formerly royal game, and it is possible that those birds have frequented this place since the time that Thomas Randolph, Earl of Moray, Regent of Scotland, held his court within the ancient hall of Tarnawa.”

ALTyre.

The beautifully wooded estate of Altyre is the property of Sir William Gordon Gordon-Cumming, Bart., a nephew of Rowallan Gordon-Cumming, famous throughout three continents as “The Lion-Slayer.” The estate is situated in the parishes of Rafford and Edin-killie, south-east of the ancient town of Forres, and a short distance

from Edinkillie, the meaning of which is "the wood on the face of the hill." This would seem to indicate, even if there were no other means of judging, that as far back as historic times take us, the district has been celebrated for its forests. The situation of Altyre House, the seat of Sir William Gordon Gordon-Cumming, is neither commanding nor can it be called picturesque, but for all that it hath charms which fully make up for what is lacking in either of the two respects named. It is embowered in ancient forest glades, in the openings of which the most lovely flower gardens are laid out in



ALTIRE HOUSE, SEAT OF SIR WM. GORDON GORDON-CUMMING, BART.

exquisite taste. The house itself, as will be seen by a glance at our illustration, is more quaint and straggling than imposing, being a combination of plain gabled solid blocks, connected by a lower pavilion, having a pretty verandah in front, covered with beautiful trailing plants. The family of the honourable and gallant baronet of Altyre is excelled by few in Great Britain for antiquity and illustrious lineage. The earliest authenticated ancestor was Robert, Count de Comyn, "a nobleman of the first rank in Scotland in the reign of King Malcolm Canmore," who was killed at the battle of Alnwick in 1093. It is said by some antiquarians that the De Comyns were of Norman descent, but that there were Cummings in Britain before the Norman conquest is proved by the fact that Robert Cumine, Earl of Northumberland, was recognised by William the Conqueror

after his usurpation of the Saxon throne. Again, there was a Cumine, second abbot of Icolmkill, who succeeded Columba in 597, and Comineas Albus, the sixth abbot, who flourished in 657. Be this as it may, the Comyns, or Cummings, held a prominent position among the notabilities of Scotland for many centuries, and from the Comyns of Badenoch—the ancient name of the district at whose lower end Altyre is situated—are descended the Earls of Buchan, Monteith, Angus, and others. William Comyn, who possessed great estates not only in the North of Scotland but in Northumberland, was one of the envoys sent by William the Lion to congratulate John on his succession to the throne of Richard Cœur de Lion. This William Comyn was the son of Richard Comyn and Hexilda, a grand-daughter of Donald Bane, King of Scotland. The “Black John Comyn,” Lord of Badenoch, was one of the Magnates Scotiæ in 1284, and guardians of Margaret, grand-daughter of Alexander III. He was one of those who treated with Edward I. of England in 1289, anent the marriage of the infant Scottish Queen, and in 1291 he acknowledged the superiority of the English King. After asserting a claim to the Scottish crown as direct heir of Donald Bane through Hexilda, he withdrew his pretensions in favour of those of Baliol, whose sister he married. The “Red John Comyn” who was the fruit of this union, played a conspicuous part in the feuds which followed the competing claims of Bruce and Baliol for the Scottish throne, and he met a tragic death at the hand of Robert the Bruce in the Church of Minorite Friars near Dumfries in 1306. The son of the Red Comyn was a favourite of David Bruce, from whom he received grants of land in the North, and his son “Ferguhard Cuming of Altyr” is the first member of the family designated after the estate now under consideration. From this date—1384—till the present day the Cummings have exhibited themselves a valiant and accomplished race, which has produced soldiers, statesmen, scholars and poets. In the vicissitudes of so many generations, and so many political upheavals, the great estates of the Cummings have not been preserved, but it is a proud boast that for five centuries Altyre should have been in undisputed possession of the family. In the beginning of the present century a great deal was done for the improvement of the estate by Eliza Maria, wife of the second Baronet, daughter of John Campbell of Islay by Lady Charlotte Maria Campbell, daughter of John Duke of Argyle. She executed a great deal of planting, and opened out, by means of drives and walks, many of the beauties of the natural forest which clothes the banks of the Findhorn, which forms the boundary of the property for some distance.

Before referring in detail to the woodland scenery of Altyre, it may

be well to take a bird's-eye view of the locality. The shores of the Moray Firth consist at this part of the province of a series of sand dunes or hills, of which the more notable are Culbin, to be noticed hereafter. Stretching inland there is a rolling country of the most fertile and diversified character for some four or five miles, and then following the courses of the streams the land ascends up to the peaks of the Cairngorm mountains. In the upper reaches of the Findhorn, and extending to the Spey—though with the latter we have meantime no account—there is an undoubted remnant of the ancient Caledonian forest. “Here,” says Sir Thomas Dick Lauder, “the endless fir woods run up all the ramifications and subdivisions of the tributary valleys, cover the lower elevations, climb the sides of the higher hills, and even in many cases approach the very roots of the giant mountains which tower over them. At one time we find ourselves wandering along some natural level under the deep and sublime shade of the heavy pine foliage, upheld high overhead by the tall and massive columnar stems, which appear to form an endless colonnade; the ground dry as a floor beneath our footsteps, the very sound of which is muffled by the thick deposition of the decayed spines with which the seasons of more than a century have strewed it; hardly conscious that the sun is up, save from the fragrant resinous odour which its influence is exhaling, and the continued hum of the clouds of insects that are dancing in the beams over the tops of the trees. Anon, the ground begins to swell into hillocks, and here and there the continuity of shade is broken by a broad rush of light streaming down through some vacant space, and brightly illuminating a single tree of huge dimensions and of grand form, which, rising from a little knoll, stands out in bold relief from the darker masses behind it, where the shadows again sink deep and fathomless among the red and grey stems, whilst nature, luxuriating in the light that gladdens the little glade, pours forth her richest Highland treasures of purple heath-bells and bright green bilberries and trailing whortleberries, with tufts of ferns and tall junipers, irregularly intermingled.”

“The chequer'd earth seems restless as a flood
Brush'd by the winds. So sportive is the light
Shot through the boughs, it dances as they dance,
Shadow and sunshine intermingling quick,
And darkening and enlightening (as the leaves
Play wanton) every part.”

Within what may be termed the home woods of Altyre there is, as always should be the case, a great variety of arboricultural beauty, from the tender pines of India to veritable giants of the forest, such as are pictured on the opposite page. Here we have a commingling of deciduous with coniferous trees, and



A GIANT OF THE FOREST.

the effect is more than pleasing—natural sown pines claiming attention side by side with specimens whose existence in these particular spots is due to art. With a passing glance at the tall and shapely spruces which hem in the approach to Altyre House from Forres, we turn aside to measure two very handsome Scots firs, whose straight stems of rich red hue and graceful canopy of dark-green foliage transfix attention. Intermingled as they are with other trees in the plantation, we were unable to take their accurate height from earth to the head among the thick branches, but the bole of the first is 45 ft. high, with a girth of 9 ft. 3 in. one foot from the ground, and 8 ft. 5 in. five feet from the ground, while its cubic contents are 113 ft. The second has scarcely so clean a bole, but it girths 10 ft. at one foot up and 8 ft. 10 in. at five feet from the earth, while its cubic contents are 84 ft. A short distance from this brace of fine Scots fir was a larch 80 ft. high, 10 ft. 4 in. in circumference at one foot; 7 ft. 7 in. at five feet, and with 115 cubic ft. of timber. Bearing away to the right towards the old church of Rafford, which hides its ruined and roofless walls within the depths of a flourishing plantation, we stumble across moss and lichen-covered tombstones hidden by the undergrowth. Rising from amidst these neglected memorials of the forgotten dead is a Scots fir 75 ft. high, 9 ft. 1 in. in circumference at one foot from the earth, 8 ft. 1 in. five feet up, and containing 112 ft. of clean timber. In rear of the church, and on a small knoll, is a larch 80 ft. high, with 127 cubic ft. of wood, girthing 11 ft. one foot from the ground, and 8 ft. 10 in. five feet up.

An open glade leads us to the pinetum, where we are introduced to a collection of *Cuvressus Lawsoniana*, perhaps the most notable we have ever seen. Here their handsome form, their vigorous habit, their graceful foliage of the deepest green, show what they may become as forest trees. Among what may be termed the newer coniferæ we picked out several specimens of *Picea Nordmanniana* over 40 ft. high, *P. lasiocarpa*, 25 ft.; and another very handsome specimen 30 ft.; *P. magnifica*, 20 ft., a handsome tree; *Thujopsis borealis*, 25 ft. high. The drooping habit of the latter, a magnificent tree, was very distinct, and from its uniformity in the branches was worthy of being photographed. This fine specimen, Mr. McLaren, the intelligent forester, informed us was grown from a cutting. Among others specially noted were a fine *P. nobilis*, of the glaucous variety, 28 ft. high, and bearing eight large cones; and an *Abies Albertiana* 33 ft. high. Several examples of *Wellingtonia gigantea* seemed to have been scorched by the chilling winds of last spring, but a grand specimen of this noble tree near the garden measured 36 ft. in height, and girthed 6 ft. 5 in. at one foot from the ground, and 4 ft. 2 in. at five feet up. Near it was a *Pinus monticola* 46 ft. high, and 3 ft. 9 in. in girth

at one foot from the ground. In the immediate neighbourhood of the house there are a large number of ashes, which give quite a character to the woods. Among those worthy of mention are the following:—No. 1, 90 ft. high, 17 ft. 6½ in. at one foot from the ground, and 14 ft. 5 in. five feet up. The tree breaks into two strong forks about twelve feet from the earth, each of them being 4 ft. in circumference. No. 2 is 12 ft. in circumference one foot up, and 9 ft. 8 in. five feet up, with a clean bole of 20 ft. These two trees are said to be 250 years old. In rear of the house in a sheltered opening in the plantation is a *Picea Nordmanniana* 40 ft. high, laden with cones, a *Pinus excelsa* towering in its graceful beauty to a height of 61 ft.; a *Wellingtonia* 50 ft. alongside of the uncommon *Cotoneaster nummularia* with its coral berries, and a very nice Bladder tree, quite a curiosity so far north. Nor must a purple beech be forgotten, which, rising to a height of 48 ft., girthed 5 ft. 6 in. at one foot, and 4 ft. 8 in. at five feet from the ground.

In what may be called the ornamental portion of the grounds the trees are in many respects notable. To begin with, the soil seems admirably adapted for the growth of timber, being a rich loam with a deep gravel subsoil. Here we have several very fine *Abies Douglasii*, a *Pinus monticola* (full-seeded, as was seen from gathering one of the numerous cones), 46 ft. high, and 3 ft. 9 in. in girth one foot up; a splendid specimen of *Picea pinsapo* of an almost perfect outline, thick in the habit, and of a metallic light green in the foliage; a *Wellingtonia* 65 ft. high and girthing 4 ft. 2 in. one foot up, and 3 ft. 6 in. five feet up; *Pinus ponderosa* 30 ft. high, 3 ft. 10 in. in girth at one foot, and 2 ft. 10 in. at five feet—the wood of which is so heavy that it sinks in water. Further on we have *P. montana* from the snows of the Alps, and preserving here its dwarf and spreading habit. This specimen covers a diameter of 30 ft., and is in cone, and as was remarked, exhibits its best use in this country as a good cover for railway banks, or for game cover. The *Cupressus Lawsoniana* in the garden were no less beautiful than in the pinetum, and to their graceful beauty was added here the lace-like fringe of the flowers which clothed their pendent branches. Where there was so much to claim attention comparatively few of the specimens could be measured; but in and about the garden note was taken of the following: *Abies Albertiana*, 43 ft. high, 3 ft. 5 in. in circumference at one foot up, and 2 ft. 8½ in. at five feet; a silver fir 94 ft. in height, 13 ft. 8 in. in girth at one foot, and 10 ft. 11 in. at five, and containing 260 cubic ft. of timber; a *Taxodium sempervirens*, which was 23 ft. high, albeit it had lost its leader, 4 ft. 1 in. in girth one foot up, and 3 ft. 7 in. five feet from the ground. An *Abies grandis* was said by many of the party to be the best ornamental conifer observed during the day. It is 48 ft. high, and girths

4 ft. 5 in. a foot from the ground, and 3 ft. 5 in. five feet up. It was planted in 1864, so that it has made a growth of nearly three feet per annum. There was a nice *A. Douglasii* 51 ft. high and 4 ft. 10 in. in girth a foot from the earth, and 3 ft. 5 in. at five feet. One of the most graceful trees was a *Thuja Craigiana*, 40 ft. high, with a thick undergrowth for about six feet up, which many of the party alleged to be more like *T. Lobbii* than *T. Craigiana*. A handsome fern-leaved alder (*Alnus incana lacinata*) must not be overlooked, from its fine habit and beautiful foliage. This was said to be one of the first plants of the variety introduced into Scotland. There are a great many deodars scattered about the grounds, and one specimen, which an old Indian declared to be as handsome a tree of the variety as ever he had seen divorced from its native Himalayas, was 30 ft. high, and 3 ft. in girth five feet from the ground. Many of the limes about the policies are very fine, as are also the beeches. On the lawn, west from the house, there is a noble tree of the latter variety 18 ft. 1 in. in girth, one foot from the ground, and 13 ft. 5 in. in girth five feet up, with a grand head. A plane tree with a noble head and magnificent spread of branches girthed 12 ft. 5 in. five feet from the ground, and 15 ft. 10 in. at one foot. The patriarch of the collection in the neighbourhood of the mansion is a walnut, which, however, has seen its brightest and best days, though hooped up as it is it may stand the blasts of many a winter yet. It is hollow, has three large limbs still remaining, a fourth having been cut, as it threatened an outhouse of the mansion, and is now, though crowned with a leafy head, evidently "living on its bark." It is 15 ft. 2 in. in girth a foot from the ground, and 13 ft. four feet up. The late Mr. Grigor thus refers to it in his work on arboriculture:—"The tree has attained the height of 62 ft., with a trunk 4 ft. in diameter, and contains about 200 cubical ft. of timber. The soil is a deep sandy loam, incumbent on gravel. It yields large crops of fruit, which ripen almost every year. There are other trees in Morayshire of nearly similar dimensions, but on account of the soil and situation which they occupy, being somewhat later, it is only in very favourable seasons that their fruit becomes fit for dessert." There is a very fine avenue leading to the mansion through the park; the avenue is a mile long, and consists of handsome beeches, limes, ashes, and willow-leaved poplars. Two of the beeches measured, girthed 18 ft. at one foot, and 12 ft. 6 in. at five feet; and 15 ft. 11 in. at one foot, and 11 ft. 4 in. at five feet from the root respectively, while a Black Italian poplar, with a clean equal-sized bole of 30 ft., measured 11 ft. 3 in. in circumference at one foot, and 9 ft. 5 in. at five feet from the earth. The park is a grand expanse of rich old grass, dotted here and there with indigenous Scots firs, whose rugged outlines

formed a striking feature in the landscape. Nor was the interesting scene the less attractive from the herd of black pedigree polled cattle which grazed peacefully among the jagged remains of the ancient forest.

A visit to some of the outlying woods, which embrace over 6,000 acres, is well worth the trouble. In the outskirts of the demesne the Highland Railway cuts through the estate, and as along the banks seedling pines have sprung up and are flourishing luxuriantly, some of the stretches of the line afford exceedingly pretty wooded vistas. Again the ground is diversified by many exquisite glens, whose slopes are clothed with larches, spruces, and *Abies Douglasii* of goodly proportions. On the rising ground, here and there, openings have been cut in the woods to afford views of the Moray Firth, sparkling in the full flood of autumn sunshine, with the cliffs and wooded shores of Sutherland and Ross in the distance. In one of the drives cut in the face of a hill, quite a curiosity is observable. A silver fir had been blown over some years ago, and it overhangs the roadway. It has not been altogether uprooted, and although the tree is lying in nearly a horizontal position, the leading shoot, full of vigour, has turned skywards and has grown several feet at right angles to the bole of the recumbent tree. In many of the glens the spruces have been drawn up to a height of over 100 ft.

It may be said that these woods are in or past their prime, and hence it was interesting to inspect afterwards a series of youthful plantations, and also to make a rapid survey of the home nursery of about two acres in extent in which are a large number of young plants, principally Scotch fir, larch, and *Abies Douglasii*. The party were therefore conveyed to Phorp and Newtyle woods, the former 160 acres, and the latter 200 acres in extent. The plantations are mixed, but chiefly of larch and Scots fir, and planted in 1871 on a dry mossy slope. The trees are making magnificent progress, and appear in the pink of health. The situation of the plantations is a somewhat steep hill-side with a northern exposure, and from an opening near the crest of the hill a view is had, the like of which such an experienced woodcraftsman as the veteran Mr. McCorquodale declares cannot be equalled in the British islands. Stretching at our feet there is an expanse of woodland embracing over 40,000 acres, "a woody theatre of stateliest view." In the immediate background are the sand-hills of Culbin, clad with stately plantations; nearer at hand are the forests of Darnaway and Brodie, the woods of Dalvey, and the leafy glades of Altyre. Breaks occur here and there in which the yellowing grain waves responsive to the gentle breeze, like the fitting shadows on the mountain side, while away to the right, rising on the slope of a richly cultivated range of minor

hills, is the ancient ruins of some castle of the Middle Ages. Nearer at hand the ground swells from hill to mountain, all clothed with the stately greenery of the forest.

“ Woods over woods, in gay theatric pride,
Well mass'd, yet varied, deck the mountain side ;
While towering oft amidst the tufted green,
Some venerable ruin marks the scene.”

Beyond this woodland landscape are the waters of the Moray Firth, the “ Sutors ” of Cromarty keeping watch and ward over the entrance to the land-locked Cromarty Firth, the long stretch of Sutherland coast, with the white towers and battlements of Dunrobin Castle gleaming in the sunshine, while far away in the blue distance are the mountains of Sutherland and Caithness.

Leaving with regret such a charming prospect we ascend the hill, wander through larch and Scots fir plantations, rising to a height of fifty to sixty feet, till we come upon the steep slopes of Loch Romach, or Ghrumach—the lake of frowning. And truly the name aptly describes the spot. The lake lies black and treacherous in the hollow of a glen at least a couple of hundred feet deep, and surrounded by precipitous banks. The lake at no point is more than a couple of hundred yards wide, frequently it is much narrower, and as the banks are wooded from the water's edge to the very crest of the enclosing hills, the scene is peculiarly picturesque and impressive. The wood surrounding the lake is 1,000 acres in extent, and the timber principally grown is larch, to which the soil and climate appear to be specially adapted.

But ere we quit the woodland treasures of Altyre, there is another aspect in which they must be viewed. And that is from and upon the banks of the Findhorn, which Mr. St. John, the clever writer on sporting and other subjects, declares to be the most picturesque river in Great Britain. From the Lake of Romach we proceed by the Half-Davoch road, which winds for most part of the way through thriving plantations of larch, to the Sluie property, which if we mistake not, is embraced in the estate of the Earl of Moray. Leaving the highway, we traverse an irregular ride in an old wood, and the music of distant waters stealing upon the ear informs us that we approach the river. “ Suddenly and unexpectedly we find ourselves standing on the fearful brink of a deep and rocky ravine, where the river, circling along the bottom of a profound abyss, has to fight its way through countless obstructions.” Anon the stream glides in dark and cruel-looking eddies, the favourite abiding-places of the salmon, and then with a quick turn it courses like a white-maned charger over a rapid of boulders, the *débris* of some former convulsion or the sweepings of a

great flood. Here the black water breaks into creamy foam, and a perpetual mist hangs between the bright red strata which hems in the angry tide. "The cliffs themselves are shaken and the pines quiver where they wildly shoot, with strange and fantastic wreathings, from the crevices in their sides, or where, having gained some small portion of nutriment on their summits, they rear themselves up like giants aspiring to scale the gates of heaven." "We have," says Sir Thomas Dick Lauder, "sat on the point of a cliff, projecting itself over the deep bed of the romantic Findhorn, where its course is visible for some eight or ten miles towards the sea, through the depths of the forests that everywhere clothe the varied elevations on either side, and where the headlands are seen alternately to overlap one another, forming a series of distances receding behind each other, more numerous than we have ever had occasion to remark in almost any other scene; and there whilst the light clouds were coursing across the sky, we have beheld as many distinctly different landscapes produced during one hour as there were minutes in it, and each of them exquisite in its way."

The woods here are chiefly larch and Scots fir—the former from seventy to eighty years of age, and a close crop, and the latter from fifty to sixty years of age, although we come now and again upon an aged patriarch whose rugged outline tells of far more winter storms braved. The trees are from 90 to 100 ft. in height, with some exceptional ones as high as 120 ft. Some of the finest weeping birches in Britain are to be found here. These are 60 ft. high with trunks upwards of 2 ft. in diameter, and display pendent branches of spray 10 ft. in length, adding a graceful variety of verdure to scenes in themselves so grand. Among the measurements taken in this locality were a larch 108 ft. high, with a free length of bole of 85 ft. It girthed 14 ft. 5 in. at a foot from the ground, 12 ft. 4 in. at two feet, and 11 ft. 7 in. at five feet up, while it contained nearly 200 cubic ft. of timber. Another larch beside the last named was 9 ft. 3 in. in circumference at a foot from the ground, and 7 ft. 9 in. five feet up, and contained 138 cubic ft. of timber. A third had a bole of 75 ft., was 11 ft. 6 in. in girth at a foot from the ground, and 8 ft. 10 in. at five feet, and contained 140 cubic ft. of wood. A silver fir possessed a bole of 80 ft., was 18 ft. 8 in. in girth a foot from the ground, 13 ft. 2 in. five feet up, and contained 387 cubic ft. of timber—one of the grandest trees in the whole forest. A Scots fir was 90 ft. high, had a bole of 60 ft., was 9 ft. 1 in. in circumference of trunk one foot from the ground, 7 ft. 8 in. at five feet, and was estimated to contain 106 cubic ft. A second Scots fir was 75 ft. in height, and had a clean bole of 45 ft., when it forked. At one foot from the ground its girth was 9 ft. 5 in., and at five feet 8 ft. 10 in., while its cubic contents was 111 ft. An oak with a

spread of branches of 100 ft. measured 16 ft. 7 in. round the trunk a foot from the ground, and 13 ft. 3 in. at five feet. From its commercial side the forest is no less interesting to the arboriculturist, as may be noted from a quotation from Mr. Grigor with which we close our description of Altyre :—"Along the banks of the Findhorn the tree shoots up with great vigour. I have known larch thinnings removed from a plantation composed of larch and oak of the age of forty years, on the estate of Relugas, average 20 cubical ft. each tree, and sold on the spot, eleven miles from the shore, at a shilling per foot. About forty trees per acre have been removed at a time from some parts, and twice that number left interspersed with oak. This growth of measurable timber may be stated as the average produce of the larch in the best situations on the banks of the Findhorn, in the forests of Darnaway, Altyre and Logie, after a growth of forty years, and where ordinary care has been bestowed in thinning the plantations."

BRODIE.

Brodie Castle is one of the most complete ancient baronial residences in Scotland. The hand of no Vandal restorer has been here. With tower and turret and storied gables, with quaint corners and straggling outhouses, the fine old castle rises gray and weatherbeaten above patriarchal woods—a perfect picture of mediæval grandeur. Situated within quite a short distance from the Brodie Station of the Highland Railway, and some five miles from Forres, it cannot be said that the house occupies a commanding position. It is rather retired, so to speak, than otherwise, and stands embosomed amongst magnificent woods. But when the visitor comes upon it as he drives through one of the many avenues of stately trees which lead up to its portal, he is struck with admiration at the picturesque pile.

Shaw, the historian of Morayshire, says that the present laird of Brodie is "the representative of a line of ancestors longer almost than what any of the potentates of Europe can exhibit"—and he gives eighteen generations of Brodies succeeding each other in the direct male line from the time of Alexander III. The antiquity of the name of Brodie, declares Shaw, "appeareth from this, that no history, record, or tradition doth so much as hint that any other family or name possessed the lands of Brodie before them, or that they came as strangers from another country." "I incline much," continues the precise old clergyman, "to think that they were originally of the ancient Morienses, and were one of those loyal tribes to whom King Malcolm IV. gave lands about the year 1160 when he transplanted the Moray rebels." While the representatives of the family have been ever active chiefs of their clan, and what we would in more modern phraseology call

good country gentlemen, none of them have taken any prominent part in national or historical affairs. Mayhap it is to this prudence that the family owes its unbroken continuity from the dark ages, and its continued prosperity.

Though not very extensive, the estate is very compact and admirably wooded. There are nearly 3,000 acres of woodlands—a considerable portion of which consists of natural Scotch fir, and nearly the whole of the estate is well adapted for the profitable growth of timber. The policies around Brodie Castle as they at present stand were laid out and planted in the time of Charles II. from 1645 to 1680, and hence even now partake of the style of the Dutch school. Straight avenues and walks are met with everywhere, but more modern planting has done much to add picturesque beauty and artistic variety to the grand old place. Among the more prominent trees in the park, quite close up to the Castle are a beech 93 ft. in height with a clean bole of 21 ft., and girthing 16 ft. 3 in. one foot from the ground, and 11 ft. 8 in. five feet up. There are several very fine ashes, which tree, by the way, has not been planted in Scotland so numerously of late as it appears to have been last century. One measured 21 ft. in girth a foot from the earth, and after forking out very much forms a magnificent head. One of the most perfect oaks which a forester could desire to see stands on the right of the Castle lawn. It has a clean bole of 32 ft., and measures 15 ft. in circumference one foot from the ground, and 11 ft. 6 in. five feet up. Among the avenues, dating a couple of hundred years back, are a fine beech one in front of the Castle, and to the right a very handsome lime approach. The coniferæ scattered over the ground are exceedingly interesting from a forester's point of view. For instance, there is an avenue and a clump of *Abies Douglasii*, the youngest plants of which have been grown from seed produced from the older generations, which form quite stately trees. The yearly shoots of this species are often upwards of 2 ft. long. The *Wellingtonias*, from 40 to 45 ft. in height, are of a very handsome shape, and rich foliage. We noted a fine *Picea lasiocarpa* 35 ft. high, and *Abies Menziesii* 70 ft. high, with a spread of branches of 30 ft., and clothed to the very ground. Two of the finest trees among all the coniferæ were specimens of *P. nobilis*. One was 40 ft. in height and another 43 ft. Both were of a beautiful glaucous colour of foliage, with a pretty silvery bark, the stem being as straight as a mast, and the branches, especially those near the head, being adorned with candelabra-like cones. These trees were planted in 1856, and their grand appearance fully justified the encomiums which have been heaped upon the species as an ornamental tree. Another fine tree was *P. cephalonica*, 26 ft. high, and furnished with cones; while more striking for its

well-proportioned grace was a beautifully furnished *Abies morinda*, 45 ft. in height. Among the forest trees we came upon a clump of silver firs with an average height of 120 ft., and girthing from 10 ft. 6 in. to 12 ft. 9 in. a foot from the ground. On Hardmoor, to the north and west of the policies, are many fine Scots firs. The whole of the woods in this locality are magnificent, both as regards size and quality of the timber. One tree lately cut down measured 14 ft. in circumference at three feet from the ground, and there was little or no taper throughout a bole of 15 ft., where the tree forked into a picturesque top with a spread of branches of fully 90 ft. This Hardmoor is the spot which tradition points out as the meeting-place between Macbeth and the witches. Macbeth and Banquo were returning from their successful expedition against the rebels of the western isles and the invading Danes, and crossing Hardmoor, which Shakespeare represents as then a blasted heath, Banquo wearied with the journey asks, "How far is't called to Forres?" Forres Castle was then occupied by King Duncan, whom the victorious generals were on their way to meet. And after asking the question, which he stops not to have answered, Banquo greets the witches, and the colloquy occurs between the beldames and Macbeth and Banquo, in which the former is assured that he "shall be king hereafter," and the latter, "that he shall get kings though he be none." The blasted heath has given place to the beauty of the stately forest, and for the enchantments of "secret, black and midnight hags" may be heard the joyous whistle of the woodman, or the merry ring of the sportsman's gun.

DALVEY.

Dalvey is a small property between Brodie and Forres, in the parish of Dyke, belonging to Norman McLeod, Esq. The woodlands are interesting, and among them may be found numerous fine specimen trees. Close beside the mansion house, which is a plain classic building, there is an ash which girths 14 ft. 8 in. one foot from the ground and 11 ft. 10 in. five feet up. In the garden below the house is a Californian chestnut, *Pavia flava*, with a spread of branches 270 ft. in circumference, and forming a magnificent arbour, the wide-spreading limbs being upheld by forked upright posts. There is an ash 100 ft. high, measuring 10 ft. 1 in. in circumference one foot from the ground and 8 ft. at five feet; a Scotch elm girthing at a foot from the ground 19 ft. 6 in., and 12 ft. at five feet up. Two beautiful beeches arrest attention, the largest being 90 ft. in height, with a spread of branches 100 ft. in diameter, while the bole girths 12 ft. 6 in. one foot up, and 10 ft. 8 in. five feet from the ground. On the lawn, near which, by the way, is a pond with

hundreds of plants of the Lily of the Nile growing freely, exposed to the air summer and winter, there is a Japanese cedar. This species was introduced into Britain in 1844, and the following year a cutting was planted at Dalvey. It is about 30 ft. high and girths nearly 4 ft. a foot from the ground. There are a large number of *Cedrus deodara* in the grounds, but almost without exception they have a stunted growth. They have lost many branches near the ground and also their tops, when the trees were from 15 ft. to 20 ft. in height, and on that account entirely want the fine graceful character of the tree, which curiously enough is preserved at Altyre.

THE CULBIN PLANTATIONS.

We cannot leave this district without a brief notice of the remarkable plantations on the sand-hills of Culbin. In the fifteenth century the estate of Culbin was the inheritance of a branch of the family of Moray of Duffus, and came into possession of the Kinnaird family through marriage. For two hundred years so fertile and well-cultivated was the barony that it was known throughout the north as the "Granary of Moray"—the rental being equal to £7,000 per annum. Some time before this extraordinary storms had cast upon the shores of the Moray Firth, west of the Findhorn estuary, immense heaps and mounds of sand, and in course of time this sand came to be blown across the fertile lands, rendering them sterile. In July, 1695, Alexander Kinnaird, of Culbin, petitioned Parliament to be exempted from the payment of cess because "his estate, which twenty years before was one of the most considerable in Moray, was nearly all covered with sand, and the mansion house and orchard destroyed." Two years afterwards the same gentleman asked for personal protection from Parliament because three-fourths of his estate had been engulfed by the sand, and the remaining fourth had been sold for the payment of his creditors. Such ruin threatened to spread to neighbouring properties during the beginning of the present century, and it occurred to Mr. R. Grant, of Kincorth, to stay the inroads of the sand and reclaim the desert already made by planting. This he did in 1839 with the greatest success. The plantations grew on the bare sand so vigorously that the average growth of Scots fir per annum was a foot, and now the plantation has fully realized the primary object of its formation, viz., "ornament, shelter, and a sure protection against sand-drift." Mr. Grant's example was followed by the proprietor of Moy and Culbin, for whom the late Mr. Grigor planted the Culbin sand-hills to the extent of nearly 300 acres. Two-thirds of this acreage were planted with Scots fir and larch in 1840, and the remaining third in 1842. The hills of sand varied in height

from 25 to 100 ft., and so loose and unproductive were they that they seemed to change their shape with every breeze, while not a living thing could be found amongst them. For details of this deeply interesting experiment, the reader must be referred to Mr. Grigor's chapter on the subject in his work on arboriculture. Suffice it here to state that both larch and Scots fir seemed to take kindly to the sand even when almost drifted over with the moving sand, or where it had been drifted underneath them to the depth of a foot. By-and-by, the cover of the young trees became sufficient to prevent the movement of the sand, and then vegetation sprang up, fixing the sand, and forming a surface layer of vegetable mould. The annual growth of the trees was fourteen inches, and many of them clothing the former desert are now nearly 50 ft. high. In twenty-five years after planting the woods were worth £22 per acre, and now they are valued at nearly double that amount—a handsome return from what forty years ago could not be called land, but which indeed formed an ever-threatening evil. There are hundreds of thousands of acres along the shores of the British Islands which might be treated in a similar manner, and made an adornment of the coast-line, a shelter to the arable land in the interior, and a source of profit to the proprietors.



AGRICULTURAL DEPRESSION.

(Continued from page 247.)

IT has already been stated that under existing circumstances of cropping, rental, &c., much of the heavy land of this country cannot pay the expenses of arable farming; but at the same time it is worthy of consideration whether, under greatly altered circumstances of management, there may not even now be a margin sufficient to tempt the cultivators of our deep, even though heavy, clays to retain them as arable lands. Elaborate data towards the solution of this problem have been furnished by Mr. John Prout, of Sawbridgeworth, Herts, whose experiments in continuous corn-growing upon 450 acres of heavy land have been carried on for a period of nineteen years, to the entire satisfaction of the owner of the land, and to the profound astonishment of those who have prophesied the ultimate collapse of the system.

Few who read the lucid account of Mr. Prout's "Profitable Clay Farming" will be disposed to question the correctness of his statements; and the weighty opinion of Dr. Voelcker, who has watched the experiments, analyzed the soil, and reported at length, is decidedly on the

side of the successful prosecution of the plan which Mr. Prout has projected and thus far carried out. This eminent authority acknowledges that the system is not adapted to light soils or to land deficient in the mineral elements of fertility, but only for clays and strong loams. At the close of his report, Dr. Voelcker says, "No fear whatever need be entertained that under this system of cultivation and manuring the land will be impoverished, for after the twelve or fourteen years during which I have watched Mr. Prout's farming operations I can perceive no indications of incipient exhaustion, but, on the contrary, clear evidence of the great improvement which has been effected in once unproductive clay land; nor can I recognise any theoretical grounds for doubting that the wonderful improvement which Mr. Prout has achieved in his land at Sawbridgeworth will be less a success in years to come than it has been in the past. I see no reason why, with this system of manuring and an occasional dead summer fallow in order to give a thorough cleaning to the land, Mr. Prout should not be able to grow wheat or barley profitably for an indefinite number of years without injury to his land."

And Mr. Prout himself says, "I am not afraid of overwhelming imports of wheat and flour from countries where land is cheap and skies are sunny; of immense arrivals of live animals, dead meat, cheese, vegetables, fruit, or wool; and I am confident that in the present and prospective low state of the markets my system can still earn an adequate return for tenants' capital, and at the same time afford a satisfactory rent to the owner."

The secrets of Mr. Prout's system are deep and cheap steam tillage, and a liberal use of artificial manures. As indispensable requisites to its complete success he names subsoil drainage, large fields, straight and neat fences, sound roads, and convenient water supply. He has for many years sold off the whole of his straw, corn, and hay. When he purchased the land he found he had fifty-one enclosures, averaging less than nine acres each. The first four years he grubbed nearly six and a half miles of "ancient hedgerow," thus adding sixteen acres of cultivable land to the farm, and throwing the whole of it into nine fields of about fifty acres each. As the result of this he counts the forwarding and cheapening of tillage works, a great saving of expense in cleaning land, the hastening of haying and harvest operations, and a greatly increased produce resulting from the removal of hedges and tree roots, and the lessening of the depredations of birds and vermin.

By the time Mr. Prout's work of reclamation was completed he had gained 18½ acres of land at an expenditure of £14 10s. per acre. The total purchase money in 1861, including all expenses, was £16,000, or about £35 per acre. Up to that time the rent had been 25s. per

acre. In 1875 a land agent of great experience valued the farm, fixing the fee simple at £31,000, and the net rent at 45s. per acre. A sum of £4,500 had been laid out upon the land, or an average of £10 per acre. The cropping for many years has been about six-sevenths corn and one-seventh hay.

The farmwork is performed mainly with a steam plough and cultivator, the crops being sold off by auction every year. Mr. Prout correctly describes steam as "a grand power, enabling the farmer to do his work at the right time, rapidly, economically, and well." Guano, superphosphate, and bones are drilled with the seed wheat, from 3 cwt. to 5 cwt. per acre, a little guano or nitrate of soda being given as a top dressing in March, when required. Barley and oats are similarly treated with $1\frac{1}{2}$ cwt. of guano and some bones, and superphosphate, afterwards receiving $1\frac{1}{2}$ cwt. of nitrate of soda where required. Clover and hay crops receive $1\frac{1}{2}$ cwt. per acre of guano or nitrate in the spring. The artificial manure bill has averaged £1,137 per annum, or about 50s. per acre. The key-note to Mr. Prout's success is given by Dr. Voelcker in the following sentence:—"Clay soils frequently are unproductive, not on account of a deficiency of phosphoric acid, potash, and other mineral plant-foods, but in consequence of imperfect drainage, insufficient aëration, and inefficient cultivation, and the bad physical condition of the land. The aim of the occupier of such land should be to develop the locked-up, dead capital of the land, constituting the abundant and, in some instances, almost inexhaustible stores of mineral plant-food."

In summing up, Mr. Prout says:—"My seventeen years' experience down to 1878 brought these annual tenants' profits: for the first four years, *nil*; for the next nine, £365; and for the last four years £1,263 a year, or 56s. per acre on the whole farm." And he elsewhere says:—"Yield and expenditure have a greater influence upon profit than the price of corn has. In the years 1875, 1876, and 1878, when wheat, according to the imperial averages at the time of the sales, stood at only 44s. 6d. up to 49s. per quarter, the profits ranged from £1,090 up to £1,505 per annum, and, in fact, the highest profit of all was realized in 1875, when the imperial average price was 49s., not anywhere near the highest in the scale."

The following statement is fully borne out by the appearance of the crops in August, 1881:—"Nineteen years' experience at Sawbridgeworth proclaims that my continuous corn-growing and sale of the whole of the produce is not, as some might have supposed, deteriorating my estate. The crops show no decadence; they are double the bulk and the value they were when I bought the farm, or during the first four years of the experiment. The land is very much cleaner and more easily worked. Both practical experience

and chemistry confirm the expectation that, with thorough cultivation and restorative applications of properly selected manures, I may go on taking corn in perpetuity without damaging the inherent fertility of the soil. In these days, when most descriptions of farming pay badly, I can, moreover claim that my improved results have been secured economically. My farming on the whole has been remunerative."

To most heavy clay land farmers it is well known that the sale of straw is productive of very little loss, provided proper artificial manures be purchased; but where the land is light a diminution in the bulk of the manure is felt in the loss of potash. Selling off roots and hay is in such a case still more exhaustive than the sale of straw, and should be practised only upon the most fertile soils. The Rothamsted experiments, which have for many years been carried out under the supervision of Mr. J. P. Lawes, prove that the atmosphere is the main if not the exclusive source of carbon in crops, and the soil the main source of nitrogen. These experiments in continuous cropping, in many cases without manure of any kind, have been carried on in some cases for twenty-five years, and in others for a period of forty years.

The views of M. Georges Ville as to the sources of nitrogen in our crops are given very clearly in his treatise on artificial manures, and are well deserving the attention of the agriculturist. They are as follow: crops yield more nitrogen than the manure supplies, the excess being derived from the atmosphere, and not from the soil. As a proof of this he points out that the amount of combined nitrogen existing in the air as ammonia and nitric acid is small, crops getting by means of the rainfall about $5\frac{1}{4}$ lb. of it per acre. From this he concludes that they obtain the free nitrogen of the air. His conclusion that leguminous crops, such as peas and beans, clovers, trefoil, and lucerne, derive the whole of their nitrogen from the air is, however, directly opposed to the opinion of Mr. Lawes. The latter maintains that the clover plants more particularly arrest and store up in the soil the nitrogen of the nitric acid which would otherwise be drained away during the autumn and winter seasons. Certain it is that after the growth of a leguminous crop there is to be found a vastly increased amount of nitrogen in the surface soil, and this materially aids the growth of the succeeding cereal crop. Mr. Lawes appears sanguine that the Rothamsted experiments will in the end establish beyond dispute the fact that the only source of nitrogen in our crops is the store contained in the soil and the nitrogenous manures brought upon it.

The small farm system has been recommended as a remedy for the present distress, and for reasons mentioned in the first of these papers,

the occupants of such farms have not suffered so severely as the tenants of larger ones. But the evils of small enclosures, which are too often surrounded by the broadest of hedgerows, do not end with the loss of the land these hedges grow upon. They harbour birds and vermin of all kinds, shelter weeds, keep out the sun, and stop the proper circulation of air. They seriously interfere with drainage and with the works of steam and horses, often injuring the health of both animals and vegetables. Many more open cart-tracks, and consequently more gates are required, and from the small size of the fields much more time must be occupied in tillage operations. Few who have not been practically engaged in surveying and plotting land can form any idea of the acreage occupied by hedgerows. Mr. Grant's survey of the county of Devon, published in volume 5 of the R. A. Society's journal, shows that in one parish, which consisted of only 762 acres, there were 34 miles of hedgerow, occupying 54 acres of land, or 1 acre in every 14 throughout the parish. Another parish of 9,188 acres had 383 miles of hedges, occupying 613 acres of land, equal to 1 in 15 acres. The measurement of ten parishes, containing 36,976 acres, showed 1,651 miles of hedges, which, as Cuthbert Johnson puts it, "is half as long again as the great wall of China, and sufficient to extend round the whole of England." In these ten parishes there were at one time 815 fields not exceeding 1 acre, 1,347 between 1 and 2 acres, 1,293 between 2 and 3 acres, and soon in proportion, until it was found that only 327 fields exceeded 10 acres. Upon the smallest fields the loss of land was equal to fully 17 per cent. In some such locality as the above must have resided the late Mr. Mechi's friend, who, in his zeal for agricultural improvements, had thrown seven fields into one, and wrote to announce the formation of one large arable field of 6 acres!

Speaking of hedges, Mr. G. A. Dean says:—"We have ascertained in practice that hedges, with the ditches included, where the enclosures are not large, occupy, on an average, from one-tenth to one-fifteenth of the enclosures, where these are from eight to ten acres in extent. Supposing this, on a farm of 500 acres, to amount to 40 acres, and taking the rent at 30s. per acre, it shows that the farmer has to pay £60 per annum for land which is in many instances of little or no value to him; whereas if the fields were arable, adjoining each other, the hedges thrown down, drain-pipes laid along the ditches for draining purposes, and the ditches filled up, all this land might be cultivated and become profitable, besides obviating the loss of time occasioned in ploughing and working fields where crooked fences exist, and causing less injury to be done to the lands in carting over them."

The grand secret of the success of so many of those who have

chosen America as their field of labour is, that apart from the exemption from excessive taxation, which so cripples us in England, they lead lives of great self-denial, and submit to labours which in their mother country would be considered as beneath them. Messrs. Pell and Read, in their report, say:—"Few English farmers have any idea of the hard and constant work which falls to the lot of even well-to-do farmers in America. Save in the harvest, certainly no agricultural labourer in England expends anything like the same time and strength in his day's work." As an example of the small expense at which prairie lands are ploughed and prepared for seeding, we may quote the following from the same report:—"Mr. Hadwin, near Castleton, has a son twelve years old who began to plough last winter, and now drives a sulky plough with a team of horses, and ploughs three acres a day." And again:—"On the 8th of October, the crop having been cleared off, one man unaided was working two sulky ploughs, one with three horses, the other with two mules and a horse abreast, back-setting the flax stubble in furrows of a mile long—a marvellous contrast to our three-horse team at length, requiring two men with two lads to get the same number of ploughs over the ground." With three horses in the sulky three acres of ploughing may be completed, and 6s. an acre is the price at which contracts are made for ploughing cultivated land in the autumn. During harvest time a self-binding automatic harvester, to which four horses are attached, is placed under the charge of a single man, and thus cuts, gathers, and binds with wire 15 acres per day. Every two machines are attended by an expert on horseback, and in case of a stoppage from breakage or otherwise, he gallops up to repair the machine and set it going. This machine is far more effective than the ordinary reaper, as it gathers up the crop clean, leaving hardly any scattered grain, whereas in binding by hand it is estimated that two bushels per acre are lost.

The difficulties in the way of naming a remunerative price for wheat-growing are great, and soil and locality must be considered as well as rent, tithes, local burdens, and wages. In 1815 it was stoutly maintained in Parliament that no wheat could be grown in England under 80s. per quarter. But during the prolonged inquiry into the causes of agricultural distress which was commenced in 1836, some witnesses from Scotland admitted that 45s. per quarter would be remunerative. Since those days rents, rates, and the price of labour have gone up very considerably, so that any data upon which calculations were then founded would now have to be very materially revised.

The whole cost of growing wheat upon the prairie lands of America is by Messrs. Pell and Read set down at 10 dollars, or about two

guineas per acre. For this sum it can be delivered to a distance of six miles from home. The average yield of the United States is put at 12 bushels per acre, though in 1879 it reached a little more than 13 bushels. With this yield the grower can deliver at 3s. 6d. per bushel of 60 lbs. without actual loss. The average cost of the two rates of carriages (rail and water) from Chicago to New York is estimated at 5s. 2d. per quarter. About 4s. 9½d. is the cost of carriage to Liverpool. To these charges must be added another 3s. 1d. per quarter for insurance, handling, dock and town dues, portorage at Liverpool, shortage, &c. ; out of this sum the Liverpool charges alone are 2s. 1d. per quarter. But Chicago does not produce, but only receives the corn, and the average cost of carriage to Chicago is estimated at 6s. 8d. per quarter. These figures will enable the reader to estimate the cost per quarter at which wheat can be delivered into the English market.

The farming of the territories watered by the tributaries of the Missouri and the Mississippi may be taken as typical of American corn-growing generally. Of these Messrs. Pell and Read say :—"It is here that agricultural enterprise is most vigorously developed with a display of activity and energy beyond comprehension. A restlessness of motion stirs the whole body of emigrants and directs them further and further west to the occupation of new territory. The truth is they are not cultivators but, at present, only breakers of the soil ; when no virgin land is left to exhaust and not an acre of prairie rose and weed of the plains remains to turn under the sod, the face of the succeeding race will be turned towards the east, the husbandry of the mother country will be adopted, and the earth, in answer to human diligence, will give forth her increase in richer and well-earned profusion."

The conclusions at which some of the most scientific among our experimental farmers have arrived is that even the second-rate heavy clay lands may yet be made by judicious outlay and proper management to yield a profit under arable culture, and to produce much more corn and meat than heretofore. It is to increased production that we must look for help, and if such production can be obtained by an outlay much less than the value of the additional produce, the problem of remunerative farming is solved.

(To be continued.)

*ON THE SELECTION OF PLANTS FOR GENERAL
PLANTING.*

FOREST TREES, unlike the crops of the agriculturist, require but little cultivation, for what tends to improve the quality of the one deteriorates the other. Nevertheless the cultivation that many of our forest trees receive in the nursery is so foreign to their constitution, so different to nature's treatment, and so opposed to the above fact, that it is a matter of greater surprise that the failures in our plantations are so few than that they are so many. In selecting plants for general planting the three chief points to be observed are that they have not been grown on heavily-manured soils, that they are free from disease and insects, and that they have had sufficient room for development, root and branch. Plants grown on heavily-manured soils may look fresh and healthy in the nursery rows, may have enough of root and top, but lack the vigour and hardiness requisite for general planting. Such may succeed in sheltered places where the soil is fertile, but he who would select such for exposed ground courts disappointment. The luxuriant growth of artificially stimulated plants is sometimes mistaken for robustness and healthy development, but the one is easily distinguished from the other by any one who has observed the growth of the self-sown plant in its native element. Fungi-affected plants should be always rejected; they are easily known from the roots being white, with attached mycelium: also such as are affected with beetles, caterpillars, aphides, &c. The larch aphid is easily detected when the plants are in leaf, either in little black or darkish specks, or specks covered over with white powdery down on the young shoots and foliage. When leafless the dirty, sooty-like appearance of twig and bud indicates its presence. If but slightly affected, the presence of the insect is difficult of detection with the naked eye; hence the desirability of making a selection in the public nursery while the plants are in full leaf. Beetle-infested pines are easily known at any season; in summer, when the insect is active, by the drooping, sickly appearance of the twigs through which they have eaten their way, in winter by the twigs withering and falling off. Plants that have not had sufficient growing room are easily known by their slender run-up stems, thin bark, lack of branches, and small development of roots, and should under all circumstances be rejected. There is again the dissimilarity of the soils, situations, and elevations of public nurseries, and that of plantation sites generally to be taken into account. I can unhesitatingly attribute one-half of the failures of purchased plants to a disregard of the old sound maxim, that no tree should be planted on

a poorer soil than that on which it was reared, and the other half nearly to the check which the sap vessels of plants receive by their removal from low-lying, sheltered nurseries to exposed plantation sites. Where there is no home nursery the planter should select plants from a public one, somewhat elevated and exposed, giving early orders, and personally inspecting the stock.

The selection of plants as to sizes is another important consideration. One year's growth in the nursery more or less than is essential to prepare the plants for the moor, upland, or mountain-side may seem of little importance to some, and yet on that one year success or failure may to a great extent depend. This arises from plants that are too large being subjected to exposure and wind-waving before they have become acclimatized, and from small ones being plunged to an undue depth in order to get their roots into the natural soil, when the surface is covered with coarse grass or moss. It may be said that generally the sizes of judiciously selected plants should increase from a minimum on the higher and more exposed plantation sites to a maximum on the lower and more sheltered. There are exceptions, however, such as low-lying sterile moors, where the small mountain plant will succeed better than a larger size. The cost of planting also increases as we descend from the higher and more exposed ground to the lower and more fertile. This arises not only from the necessity for using larger plants, and adopting a more costly method of planting on the plain or low ground, as compared with the mountain-side, but from the additional outlay incurred in keeping down weeds and rank herbage. Planting small plants in such situations, with the view of economizing, is a mistake, for the cutting of brambles, grass, and rank weeds, in the plantation, twice in the season, for two or three successive years, adds considerably to the original outlay, so much so that it is more economical to use large plants. Let it not be inferred, however, that I recommend such sizes as will at once overtop the rank vegetation of the valley, but rather to select sizes by which the cost of weed-cutting for one or two seasons might be averted.

I shall now submit what I believe to be a judicious selection of plants (as to sizes chiefly):—

- 1st. For valley, or sheltered situations,
- 2nd. „ plain, or level districts,
- 3rd. „ moor and upland,
- 4th „ mountain-side and hill.

Valley, or sheltered situations.—The fertile bottom lands of valleys are seldom planted, being of such value for agriculture. Hedgerows

and clumps of trees are, however, very desirable there, and sometimes even stripes for shelter become a necessity. Winding valleys, from their formation, are generally well sheltered independent of trees. The case, however, is different with such as are somewhat straight, opening seaward, and swept for miles with the prevailing wind. There the shelter of trees is of the utmost importance, as the value of the land will of course depend on the efficiency of the shelter. Trees of an erect habit of growth, that do not spread too much, and yet afford the desired shelter, are the most beneficial to the agriculturist. There is no tree, perhaps, more suitable for this purpose than the black Italian poplar. It takes up but little space compared with the oak, ash, sycamore, and elm, which do so much harm to the crops on the adjoining lands with their wide-spreading branches. This poplar thrives admirably on the bottom lands of valleys that are but slightly elevated above the beds of the rivers by which they are watered. It is sometimes difficult to get up shelter in the mouth of a valley that opens seaward, dykes, with screens of brush atop, being necessary to protect the plants from the storms until they have become well established. The first two or three stripes should therefore be formed of *Pinus maritima*, a tree that will succeed in such situations, if success is possible. Those further inland should be of black Italian poplar. The pines should be three-year-old plants, one year seedlings twice transplanted, reared on poor light soil, fully exposed, and the poplars 3 ft. in height. The bottoms of inland glens and ravines and sheltered situations generally, where the soil is of a clayey loam on an open subsoil, are well adapted for nearly all the more useful deciduous trees, and the slopes for larch. Where there is a home nursery, oaks intended for such places should, if necessary, be headed down two years before their removal to the plantation. The usual way is to tap in the nursery and head down in the plantation; but the necessary care as to weeding can so seldom be extended to large plantations that the more independent they are of such the better. When the plants are robust, and of a clean growth, tapping alone is sufficient, but when unproportionally developed they should be headed down. On inferior soils heading down two years after planting out often becomes a necessity, from the check the plants receive by such a change for the worse. But on such soils generally the weeds are easier kept down. Deciduous trees, such as oak, ash, elm, &c., for sheltered situations, should be from 2 to 3 ft. in height, larch, spruce and Scotch fir nurses from 16 to 20 in., or two year seedlings, two year transplants. Some planters are of the opinion that in sheltered situations the plants should stand 6 ft. apart, this, as they say, saving so much on plants, planting, unremunerative early thinning, and also giving the plants a wider root-range. Experience has

taught our best arboriculturists otherwise. Young trees derive more benefit from the nursing they receive when planted from 3 to 4 ft. apart than from any additional root-room, and such as are unhealthy or deformed may be weeded out among the first thinnings without leaving any unoccupied spaces. Thus a full crop of clean-grown timber is ensured.

Plain, or level districts.—Although the arborical features of level districts where the soil is moderately fertile are chiefly hedgerow trees, clumps, and stripes for shelter, yet where the soil is inferior large plantations are by no means rare. At the present time there is more likelihood than heretofore of planting such lands extensively, on account of the depressed state of agriculture. The question now is not "What waste lands ought we to reclaim for cereal growing?" but "What arable lands ought we to plant?" Some instructive papers on the preparation, draining, and planting of inferior clay lands have already appeared in the *Journal*, but as the costly course prescribed in some of them might discourage rather than stimulate gentlemen who contemplate planting extensively, I would humbly submit what I believe to be the best way of procedure. All the draining which I consider necessary for such lands is furrows opened with the plough 3 in. deep and 6 yards apart, arranged so as to cross any surface depressions there may be, where drains 3 ft. wide at top, 9 in. at bottom, and 2 ft. deep should be made for them to empty into. Where the surface is inclined to be level, and the depressions few, drains of the above dimensions should be made in every thirty yards for the same purpose. The fallowing of such lands appears to me quite unnecessary. When the planting of extensive tracts is decided upon, a small portion could with advantage be turned into a temporary nursery, where seedlings of the required varieties could be transplanted and prepared economically for removal, thus acclimatizing them to their ultimate locality. Oak, alder, birch, Scotch fir, spruce, and larch will succeed on such soils, the two last, however, only as nurses. Where there is a market for pitwood, railway sleepers, clog wood, and charcoal, Scotch fir and alder will prove more remunerative than any of the other varieties just mentioned. The larch, though serviceable as a nurse, cannot be relied upon alone, for it may cease to thrive at any time between the age of ten and thirty-five years. It will not stand the repeated attacks of bug, as it would on more suitable soils; hence its frequent early decay. Later on it becomes affected with heart-rot. The spruce also succumbs to the gall aphid sooner on this soil than on any other. The appearance of young trees for the first few years after planting on poor clay is seldom very encouraging, but they rapidly improve when their branches meet, and they shade the ground. When a first crop is cut down, and the ground replanted,

the second starts under more favourable circumstances, the roots having loosened the soil and penetrated the subsoil. It is a mistake to grub out the roots and stumps before replanting, for by so doing the soil is put into the best possible condition for relapsing into its original impermeable state. The best sizes of plants for inferior clay or any other soils (whether the land be arable or waste) in level districts somewhat exposed are well-rooted, deciduous trees about 2 ft. in height, two year seedlings, two year transplanted pines and spruce, and one year seedlings, two year transplanted larch. Notching is the best method of planting to adopt if the plant roots can be freely inserted; if not, pitting must be resorted to.

Moor and upland.—Moors, from their general inferiority of soil and exposure, are, as we have already remarked, unfavourable situations for many of our forest trees. If of a ferruginous nature, and moorland pan forming, they should be drained two or three years before planting. Stagnant water is the chief agent in the formation of pan. Becoming impregnated with a vegetable acid, which dissolves the iron in the soil, it evaporates during dry seasons, and produces thin layers of iron ochre, which gradually turn into pan. Efficient drainage immediately arrests its formation, but if formed and very hard it takes years to melt away. When thus operated upon it will, however, lose most of its poisonous character before the roots of the plants come in contact with it. Although the Scotch fir is pre-eminently the tree for sterile, heathy moors, larches as a mixture may be profitably grown, if the soil is not too hard and retentive. The timber of the former, from its somewhat slow growth, is generally on such soils of excellent quality, nearly, if not equally, as good as larch. The latter is liable to premature decay, caused by heart-rot. On wet, peaty soils, where the natural herbage is chiefly white bog moss, mountain down, rushes, or bog myrtle, thorough drainage and the solidification of the peat are necessary before any tree will grow upon them. When this is accomplished, however, they will, if planted with alder, spruce, birch, and mountain ash, yield a medium crop. Scotch firs selected for moorland planting should be two year seedlings, one year transplanted, and larch one year seedlings one year transplanted. The deciduous trees for wet, peaty land should be from 15 to 20 in. in height.

When the climate of an exposed upland district has been already ameliorated by the influence of trees, success in planting is easily attained; not so, however, if in its original severity. The planter must then make a selection from among the most hardy trees, whatever their timber value may be when matured, to become the pioneers of more valuable varieties. Scotch fir, birch, and mountain ash are the most suitable trees to begin with. In stripes or wind-breaks, and on

the exposed sides of large plantations, they stand exposure better than any other kinds. When a large tract is enclosed for planting, and the soil adapted for larch, it would be well to plant a broad stripe of the hardy trees just mentioned within the exposed boundary, and parallel stripes at any point within the enclosure where shelter is required, three or four years before planting all the ground, which should be with a mixture of larch and Scotch fir. Larches planted on suitable soil generally overgrow Scotch fir, and on high and very exposed ground the top twigs and leaders get blasted with the storms, but when thus sheltered they grow unchecked. We recommend a mixture of Scotch in case of blight at any time affecting the larch to such an extent as to make substitution necessary.

As the more hardy trees become established and some shelter is obtained, sycamore, beech, Norway maple, oak, *Pinus laricio* and *Austriaca* may be added to the list of trees suitable for upland planting. That only such plants as have had hardy up-bringing will succeed is obvious to all. Two year seedlings, one year transplanted, Scotch fir, *laricio* and *Austriaca*, one year seedlings, one year transplanted larch, and deciduous trees from 12 to 18 in. in height are the most suitable for upland planting.

Mountain-side and hill.—Where judgment, with the necessary experience, has been exercised in the planting of mountain-side or hill, the results, as an investment, will in general compare favourably with anything in the records of tree-planting. Success, however, in a great measure depends upon the importance attached to the altitudes at which timber can be profitably grown, the amount of exposure that our hardy forest trees can bear, and the unsuitability of some soils for growing any kind of tree. In the highlands of Scotland, for instance, useful and profitable Scotch fir timber is grown on hills at altitudes from 1,200 to 1,500 ft., and yet on others in the same district it is impossible to get it to grow above 800 ft. This arises from the former being sheltered by other (though perhaps distant) hills, while the latter are fully exposed. Hills again, formed of hard rocks that decompose but slowly under the influence of the weather, such as the hard grits in some parts of Wales, are, from the light, peaty nature of the soil, quite unsuited for growing trees, although at first sight the impression might be the opposite. It is also difficult to get trees to grow on hill-sides where the wire grass (*Nardus stricta*) is the predominating vegetation; not so much from altitude and soil, as from exposure, and the close growth of this grass preventing the moisture from penetrating readily into the soil. Where it is difficult to get trees established on a hill or mountain, broadside to the prevailing wind, planting should begin at the base, and be gradually extended upward; every succeeding addition will thus be

benefited by the shelter the preceding one affords. Again, when the prevailing wind sweeps along the situation, planting should begin on the exposed side in the shelter of a turf or stone dyke. This creeping way of ascent is not necessary when other hills afford shelter, and when only such trees as are best adapted to the soil and situation are used. Some of the plants that grow naturally on the mountain-side or hill will help the observant planter in coming to a conclusion as to the altitude at which timber can be profitably grown. Where the primrose, bilberry, tormentil, bracken, and the close healthy heath mixed with the common grasses cease to luxuriate, let him not expect great returns. Larch, Scotch fir, and birch are the most profitable and most suitable trees to plant in such situations. The larch should be mixed with the Scotch fir on the lower grounds, and the birch on the higher. The most suitable plants, as regards age or size, are one year seedlings, one year transplanted larch, two year seedlings, one year transplanted Scotch, and birches 12 in. in height.

Llanelly, South Wales.

ANGUS MACINTOSH.

THE PARTRIDGE.

Classification, characteristics, haunts and habits ; its nesting, laying, sitting and hatching ; feeding ; shooting with beaters, dogs, driving, and with the kite ; general remarks.

THE partridge belongs to the order *Gallinæ*, the family *Tetraonidæ*, and the sub-family *Perdiciinæ*. Its plumage is soft and very compact, being a mixture of grey, brown, and dusky red. Several of our poets allude to *nut-brown* partridges, and their description is not far wrong, if we take into consideration the general appearance of the birds. The partridge presents a very plump and heavy body, with short neck, small head, and short and strong legs. It is a rapid runner, and its powers of flight are great. The average weight of the cock is about 14 oz., and that of the hen 12 oz. Before they have completed their plumage, or up to the end of October, the young birds may be distinguished by the lancet-shaped first feathers of the wings, these becoming more rounded in old birds, probably from use, and especially from their regular habits of dusting themselves. The bill of the young bird is brown, and its legs are of a dusky colour. In old birds these parts become of a bluish white. But in order correctly to test the age of a bird, take it up by the lower mandible of the beak and hold it out : if young the mandible will bend, but if old this remains rigid.

Partridges are found in almost every part of the world, and they possess wonderful powers of adapting themselves to climate. Thus,

in Greenland they are of a brown colour in summer, and in winter their plumage becomes white, while at the same time a thick down forms beneath it. In some countries the birds are longer on the leg, and live more among the rocks.

Partridges are said to be monogamous, and when once paired to remain so for life. But where they have to seek for new partners the usual time of pairing in England is about the second or third week in February, but this is greatly dependent upon the weather, a mild season bringing the birds together earlier. When severe weather returns after pairing the birds *pack*, or get together in considerable numbers, irrespective of coveys. The nest consists of withered grass and leaves, is rude in its construction, and is generally made in clover, long grass, in corn-fields, or in the bottom of hedges. Instances have been known of their being placed on the tops of pollards, from whence the young birds have descended in safety.

The partridge lays from 13 to 20 eggs, about the size of those of the pigeon, either grey or of a dull coffee colour, and somewhat obtuse in shape. She sits for three weeks, and is not easily disturbed when near hatching. In early seasons most of the birds are hatched off between the 1st and the 10th of June. The earliest fly by the end of the month. Grahame says of her :—

“ Yes, she will sit, regardless of the scythe,
That nearer and still nearer, sweep by sweep,
Levels the swathe ; bold with a mother's fears,
She, faithful to the last, maintains her post,
And with her blood sprinkles a deeper red
Upon the falling blossoms of the field.”

When the first nest is disturbed, if not injured, she lays again ; but if not shot in October these late birds seldom survive a severe winter.

Almost as soon as hatched the young birds run about ; and being taken by the parent birds to ant-hills, they greedily devour the larvæ and thrive wonderfully upon them. Besides insects of all kinds, the food of the partridge consists of tender vegetable substances, buds, seeds, and grain. The old birds show much courage when surprised in the midst of a covey. The cock generally rises first and gives the alarm, hovering near as if to give the others every chance of escape. He often flutters along the ground with drooping wings, feigning lameness and inviting to follow. In cases of extreme danger the hen has been known to tumble along the ground in front of a dog, until she has drawn him away. At other times the partridge is very timid, and the author of the “*Faëry Queen*” speaks of “the feareful partridge.”

The number of partridges reared depends greatly upon the weather during the period of incubation and immediately after hatching,

When the eggs become chilled they prove unproductive, and cold rain and wind benumb the young birds. Hawks, also, are very destructive. But if June and July are tolerably warm and dry the coveys generally come out well. They usually consist of more cocks than hens; hence at pairing time battles are frequent. It is generally supposed that the chestnut-coloured horseshoe upon the breast is a distinctive badge of the cock bird; but this is by no means an unerring distinction, though a common one. And a young cock partridge in November, with his bright head and perfect horseshoe, is both a beautiful and a symmetrical bird.

Partridges are easily decoyed either by means of a perfect "call"—which may be heard but should never be described—or by being entrapped in tunnel nets, which was once a common practice, and by which whole coveys were taken at a time. Indeed, a century ago netting was the common method of taking partridges, a sport then enjoyed almost exclusively by the lord of the manor and his attendants.

The French, or red-legged partridge, has obtained a bad name in some districts from its pugnacious propensities, and more particularly from its habit of running before dogs instead of rising. It is considered a bolder bird than the common partridge, and will sometimes roost in trees. It is common in France and the countries of Southern Europe. The first birds introduced in England are said to have been turned out in Windsor Forest in the time of Charles II.

Partridge shooting commends itself to the sportsman partly from the healthy exercise it gives, but mainly on account of the sport it affords at the smallest possible expense. Unlike the pheasant, which, in its wild state, recedes before the progress of agriculture and improved farming, and can only be obtained in abundance when hand-reared and carefully watched and tended, the partridge seems to flourish most where the best cultivation prevails. As a proof of this we may point out their abundance in market-garden districts. The good old stubble of one's boyhood, knee-high, with plenty of thistles, coltsfoot, docks, and an abundance of grass, has become a thing of the past, and steam cultivation and reaping machines leave little to shelter the shy birds of modern times. Happily the field cultivation of potatoes, mangolds, turnips, cabbage, and kale has to a certain extent replaced the rubbish of former years, which is now mainly "conspicuous by its absence;" and though, except at feeding times, we cannot often make

"The fluttering coveys from the stubble rise,
And on swift wings divide the sounding skies,"

we can at least follow them where good cover exists.

The fact that partridges have distinct sleeping and feeding grounds

should never be lost sight of, and that from about two hours after sunrise until dusk, allowing an interval of three hours during the heat of the day, is the best time to meet with them. During the heat the scent is weak, and unless hunting against a wind dogs have little chance. The birds call at daybreak, and as soon as they have collected they fly off to the stubbles. When these are high enough to afford good shelter the birds remain in them, provided the day is not too hot, in which case they make for the root-crops and cabbages, or get into hop-gardens. After the evening feeding they call again and return to the pastures or their customary resting places. It is difficult to get near while they are calling, as they seldom lie well.

The First of September is probably the most universally popular day in the calendar of the sportsman, and more especially with the juniors, many of whom are annually known

"To go to bed and weep for downright sorrow,
To think the night must pass before the morrow."

And partridge is almost the only shooting in which non-shooting friends can bear a part without being in the way. Here they may be very useful as "markers."

The two main requisites for a good day's partridge shooting seldom come together, viz., abundant cover and plenty of birds; for the dry season which favours the birds is not conducive to cover, and the dropping season which produces the latter is often fatal to the birds.

The law which fixes the 1st of September as the commencement of the partridge season, irrespective of the progress of the harvest and the strength of the birds, is evidently a mistake. In some seasons the birds are shot before they are full-grown, and in others they have to be followed into the standing corn, often to the annoyance of the farmer and the injury of his harvestmen. In France, Belgium, and some parts of Germany, the time for commencing shooting is fixed by the authorities of the various departments, who look mainly at the harvest prospect and issue their edicts, which are conspicuously placarded on all sides. In the south of France the date is often a full week earlier than in the north, and sometimes the sport begins as early as the 12th of August. The opening day is a grand one in nearly every village. But the endless subdivision of estates which has so long gone on in France has limited the beats of most landowners, and consequently the chances of a good day's sport are remote.

A good rule when partridge shooting is to fire quick, while the feathers are well open, at the same time giving the bird reasonable "law." Never rake the covey, perhaps winging or wounding two or three birds, and bringing nothing down in a true sportsmanlike

manner, but as much as possible select single outsiders, doing the work neatly. At the commencement of the season it is no unusual thing for a considerable number of old cocks to fall to the guns. This is mainly attributable to their habit of rising first, and hovering, as if anxious about the fate of their young.

When markers are employed these should be steady and well accustomed to their work, signalling to the sportsmen when necessary, but making scant use of their voices. They should be trained to mark their birds well down, and not take their eyes off when the covey comes near the ground, for it is often seen that upon bare pastures and close-shaven stubbles the birds drop suddenly and then skim along considerable distances, afterwards running to the shelter of the hedgerows. Towering birds, also, generally fall much nearer than a careless observer might think, and as these are always dead and generally upon their backs, their descent should be marked with precision.

Various methods are adopted in partridge shooting. Beaters are sometimes placed between the guns, in which case it is necessary to keep a good line. The beaters should be as silent as possible. Where driving is resorted to, this should commence from the outside of the beat. It is a legitimate sport and requires a good shot to make up a large bag. It bespeaks good generalship to arrange the guns and beat successfully. For those who have extensive beats and but little time to devote to them, or others who are physically incapable of great exertion, driving may afford good sport. Dogs are of no use in partridge shooting unless they are thoroughly broken. If they have continually to be rated, whistled to, or punished, they completely spoil the sport. A led retriever is about the most useful dog. Undoubtedly the steady working of well-broken dogs adds much to the pleasure of partridge shooting; and a dog that will cautiously and perseveringly "seek dead" is most valuable. The birds may be shot either to a pointer or to a setter, the latter being preferable for a rough country and the former where birds are very plentiful.

Partridge and grouse shooting with a kite has of late years become a fashionable sport. But we have it on good authority that it generally results in driving the birds far away. But though shooting under a kite may be looked upon as deadly sport, the bags are by no means as large as might be expected. The bewildered birds rise in the most irregular manner, sometimes imitating the flight of the snipe, occasionally dropping again instantly, some half fly and half tumble along, others fly straight towards you, and the remainder spring up before, behind, all round you, and from under your very feet, and all this from the fear inspired by the monster hovering over them, and from having their eyes fixed upon it. Let no man be considered a

bad shot who can make a good bag kiting. The guns should always be to the windward of the kite, this drawing down wind, until it becomes stationary over the best cover. Birds moving under the kite, but not rising, generally creep away to cover under the hedges, root-crops, &c., all of which should afterwards be very carefully beaten.

As the sportsman is so dependent upon the farmer for good shooting, every precaution should be taken against entering the standing corn, treading down hedges, and leaving open gates so as to cause cattle to stray. A little care in this respect will be more than repaid in the preservation of nests and the general protection afforded to the birds by the farmer and his labourers.

By no means one of the least recommendations of partridge shooting is its effect in keeping in the country many of those who would otherwise go abroad, and in bringing home those who have travelled or remained in town during the summer. It also affords at a small expense healthy and invigorating exercise to the wearied professional man; enables the parson to "drive a field" with his churchwarden, and afterwards discuss parochial or other matters "across the walnuts and the wine;" and gives the tenant an occasional opportunity of spending a few hours pleasantly and profitably with his landlord. The sport properly carried out may be said to be about as conducive to the maintenance of a sound mind in a sound body as any of our popular pastimes.

Any suggestions with regard to dress and refreshments while shooting may be looked upon as useful only to the merest tyro. But as the real enjoyment of the sport is largely dependent upon a proper equipment, we may mention as requisites, a flannel shirt, woollen socks, well soaped inside, strong but not heavy lace-up boots, and a light ventilating hat. Cold tea has been strongly recommended as a beverage in preference to beer, wine, or spirits; but as some may condemn such a wholesome and appetising drink, it may be stated that a very small quantity of gin, taken in a liberal quantity of water, keeps the pores open and the skin cool and comfortable.

Gastronomically the partridge may be looked upon as one of the most delicate and useful of birds, and though a young one may be enjoyed even on the evening of the first of September, an old one should always be well hung before eating. Some epicures have believed that if it had but the thigh of the woodcock it would be the best bird which flies. There is no doubt but its flavour depends very much on the manner in which it is treated immediately after it is shot. Stuffed in a close bag, or in a pocket, it becomes nearly worthless, but if carried in the open net, or upon the partridge stick, its full flavour is preserved.

A. J. BURROWS.

THE COLLECTION AND RIPENING OF TREE SEEDS.*

PROPGATION by seed is the natural way, and yields the most vigorous plants, for which reason preference is to be accorded it in raising trees. There are, however, divers impediments to this mode of propagation. In some species the seeds germinate with difficulty; others, owing to climatic influences, fruit only at long intervals of years; whilst in others the seeds mature, but the produce differs from the parent stock. Still, the raising of trees from seed is in most cases the only practicable, in some the only possible, way of getting strong, healthy plants.

The ripening of the seed is indicated by the colour, by the seeds bursting their capsules or husks, and, most surely, by their dropping off.

The season of seed ripening ranges from mid-spring to late winter, some sorts not maturing until the second year. An exact knowledge of the times at which different species and varieties ripen their seeds is indispensable to the forester.

About Vienna, *Ulmus Americana* ripens its seed in the month of May; the various poplars, *Ulmus campestris*, *effusa*, and *montana*, also the willows, ripen theirs between end of May and beginning of August; in August ripen *Acer dasycarpum* and *rubrum*, *Prunus cerasifera*; between end of August and beginning of September, *Betula alba*, *excelsa*, *nana*, *populifolia*, and *pubescens*, *Berberis aquifolium*, *Celtis occidentalis*, *Crataegus coccinea* and *nigra*, *Prunus padus*, *Rhus cotinus*, *Taxus baccata*; between August and October, *Tamarix Germanica*; in September, *Æsculus flava* and *glabra*, *Hippocastanum pallida*, *pavia*, and *Amygdalus*, *Betula nigra*, *Pyrus communis*, *Rhamnus cathartica*, *Thuja*; end of September and beginning of October, *Carpinus*, *Castanea vesca*, *Corylus*, *Cydonia*, *Fagus*, *Fraxinus*, *Pinus abies*, *balsamea*, *Canadensis*, and *nigra*, *Pyrus malus*, *Quercus alba* and *pedunculata*, *Robinia pseudo-acacia*, *Thuja occidentalis*; end of October and beginning of November, *Pinus larix*, *Platanus*, *Alnus*, and *Robinia viscosa*.

The time of gathering the seed will depend on the ripening. Early ripening seeds are collected as soon as the fruit begins to drop off; those that ripen late can be gathered in winter or early in the ensuing spring, as the fruit falls or is shaken off by the wind. Fruit like pine and fir cones, which are liable to the attacks of birds and squirrels, should not be left too long.

After gathering the fruit is subjected to a process of ripening off, being laid in heaps to sweat, and frequently turned over, whereby the

* Translated and condensed from *Das Holz und seine Distillations-Products*. (Vienna, 1881.)

superfluous moisture is got rid of, when it is spread out in an airy, sheltered place to dry.

In drying, a temperature of about 90 degrees Fahr. may be employed without detriment to the vitality of the seeds, but there must be plenty of ventilation.

The cones of conifers are spread out thinly on dry floors and exposed to a temperature of about 90 degrees Fahr. by stove or sun heat, under the influence of which the scales open and the seeds drop out. Special places are provided for this purpose, known in Germany as "*Klenganstalten*." * With highly resinous species extra care is requisite, lest the temperature be too high, and so soften the resin and clog the scales. This is particularly the case with the cones of larches. The open cones are placed in rotating cylinders, from which the seeds are rejected. These are cleaned and sorted in a cool place. As the vitality of seeds is impaired by exposure to heat as well as cold, a medium temperature should be maintained as far as possible.

As regards the duration of the germinating power in seeds, comparatively few observations have been made; the most that is known is that it is, as a rule, brief, and that it can be prolonged only by leaving the seeds in the fruit. Seed thus left in pine and spruce cones will grow at the end of five years; in those of the silver fir and some others, the power only lasts two years; whilst those of cedars and stone pines will germinate after thirty years. The quickest to lose their vitality are the seeds of beeches, oaks, walnuts, chestnuts, almonds, and stone fruit generally.

A portable apparatus has been constructed by an Austrian seed-merchant, with which the germinating power of any seed can be tested easily and expeditiously. It consists of a rectangular wooden case, 16 in. high, provided in front with a close-fitting door. Inside are five tiers of sheet-iron shelves or trays, two in a tier. Each tray is 2 in. clear of the one above it, and holds a forcing-plate formed of a piece of felt, 6 in. long, 2 in. broad, and $\frac{1}{4}$ in. in thickness, faced with a porous composition of firebrick, sawdust, and powdered charcoal, and having on its upper surface 100 small holes or cells, in five rows, each cell taking a single seed. If the temperature of the place is suitable for germination, it needs only to put some water in the trays, lay the forcing-plates therein, taking care that the felt is well soaked, and then on each plate place a hundred seeds taken at random from the sample, a seed in each cell. Inspection of the interior of the

* From *kleng*, and *anstalt*, a place or establishment. *Kleng*, derived from *klengeln*, to chink, has various provincial forms, as *klenken*, used in the district of Wetterau, and *klengen* or *klanken* in Thuringia. It is employed to denote the process of separating the seeds of conifers by heat, but in some localities it is used to signify any process of stoning fruit.—See Lucas, *Wörterbuch*, vol. i.

case from time to time will show whether the seeds sprout and make growth with due regularity and vigour, and what is the percentage of dormant or "idle" and dead seeds.

Means are likewise provided for heating the case when the external temperature is too low, or when it is desired to accelerate germination. For this purpose the case is made with double walls, between which hot water, heated in a miniature boiler, by a paraffin lamp attached outside the case, is led, the space between the hot-water passages and the outer case being packed with ashes, to prevent loss of heat by radiation. In the outer face of the door is inserted a small mercurial thermometer, the bulb of which is bent so as to reach well into the interior of the case, and enable the temperature to be read outside.

Five minutes' attention daily to the following points will keep the apparatus and the seeds under trial in it in going order:—

1. See that there is water in all the trays.
2. Remove any moisture that may have condensed in the case, by emptying the drip-pan provided to collect it.
3. Fill up the little boiler attached, as otherwise the hot water will not circulate.
4. Trim the lamp, and remove any soot and grease.

When the trial is over, run off the hot water by means of the valve provided for that purpose; wash the forcing-plates in warm water, or, what is better, lay them for a few hours to soak in clean cold water, so as to remove any impurities that might clog the pores; dry the whole thoroughly, and the apparatus is again ready for use.*

To prepare the seed for sowing various materials are utilized, such as sawdust, bark, sifted earth, litter, and chaff. The seeds are stratified therewith in a warm covered place, and the mass is wetted. Hard-coated seeds require a moderate amount of moisture, those with a thin husk need less; or the seeds may be laid in warm or cold water, taking care that they do not ferment. The addition of ashes or unslaked lime promotes the germination of hard-coated seeds. The steeping should take place immediately before the seeds go in the ground, else they will suffer by drying again. All things considered, the best time for sowing is in spring. The seeds then are less exposed to injury from the attacks of small rodents and from damp. As a rule, seeds germinate quickest at the season when they fall, which in the majority of cases is in spring. Seeds devoid of albumen

* The apparatus above described is the invention of Herr J. Steiner (Steiner & Hoffmann, seed merchants), Vienna-Neustadt. It is sold at 42.5 Austrian florins (86s.). A smaller apparatus for the same purpose is sold by the same firm at 3 fl. (6s.). This consists of a porous earthenware dish and cover, in which, on wet sand or sawdust, is laid one of the above-described forcing-plates with cells for 100 seeds.

germinate quicker, and the young plants grow faster, than those of ligneous species.

Experiments have shown that the commencement of germination differs immensely in different seeds, but no precise law has yet been discovered. Some seeds sprout the first day, others take months, and old seeds longer still. The conditions essential to germination are moisture, air, and warmth, or, at least, a temperature above freezing point. Higher temperatures, up to about 77 deg. Fahr., the presence of oxygen, of dilute acids, and darkness, favour germination, as does the action of ashes and alkalies on hard-coated seeds. All seeds swell in water, whether they possess the power of germinating or not, absorption being a physical, not an organic process. The seed absorbs by its whole surface, not by its base alone, although in some seeds the water seems to penetrate more readily at the latter point. The water is not decomposed by the husk. When the albuminous substance or cotyledons swell the husk is ruptured, regularly around the base, and in an irregular form in other places. Seeds containing much albumen have thin leaf-like envelopes, which absorb freely, and thus are sooner softened. Such coverings contain a larger proportion of stomata, which facilitate absorption. It has been proved by experiment that seed will not germinate in the absence of oxygen, nor in distilled water saturated with carbonic acid gas. Seeds that are growing vigorously may be stopped by withdrawing the supply of oxygen; they grow better in proportion as the percentage of oxygen left is larger, and best of all in ordinary atmospheric air.

The connection between germination and temperature will depend on the climate in which the seeds grow. Some species germinate well at a temperature a few degrees above freezing point, others require a higher one up to about 68 degs. Fahrenheit, whereby the absorption of moisture is promoted.

If the absorption is excessive the seeds are rendered watery and weak. A temperature of 100 degs. Fahrenheit and likewise exposure to direct sunlight are injurious to germination: ordinary daylight is less so, but night favours this process most. Germination commences with the generation of heat, to which other chemical processes succeed. The chief constituent of seeds is starch, which in the germinating process is first softened, then becomes semi-fluid, when the starch granules vanish, becoming converted into sugar and mucilage, in which process carbon is consumed and water assimilated. Germination is a process of fermentation, in which water, air, and the solid constituents of the seed react on each other within infinitely small spheres.

In germination the radicle emerges first, and deriving nutriment

from the seed-coats, induces the first downward movement of the juices. Thence follows the elongation of the plumule or leaflet, and both continue to grow so long as the supply of nutriment in the seed lasts, after which, unless the rootlets have taken hold of the soil, they die off. Once rooted, the plant shows indications of an outer tegumentary covering previously wanting, with numerous stomata and a whorl-like arrangement of its vessels.

As regards sowing, the season when the seed matures naturally is, of course, best. Three seasons are usually recognised—autumn, spring, summer—the choice of which in individual cases will be influenced by the readiness with which the particular seed germinates, and its power of retaining its vitality.

Autumnal sowing, when practicable, has many advantages: it economizes labour, the seed undergoes a sort of natural preparation in the ground during the winter, the young plants are more vigorous and less overgrown by weeds, but the seed is peculiarly exposed to the ravages of field mice.

Spring sowing is to be preferred where the latter evil is feared.

Summer sowing is most suitable for trees which ripen their seeds in the summer months, from May to August, and the seeds of which do not long retain their vitality. It saves time and gives more certain results.

In Austria they sow black, silver, and spruce firs, common beeches and alders in spring, elms in summer, purple-leaved and silver beeches, oaks, ashes, maples, birches, planes, and Scotch firs in autumn.

Of the manual operations of sowing, and the rearing and transplanting of the young trees, no details need here be given.



A VOICE FROM THE DEAD, URGING THE ORGANIZATION OF A SCHOOL OF RURAL ECONOMY AND FORESTRY.

SCHOOLS of Forestry on the Continent have only been the product of the last hundred years, and though now to be found in almost every country on the Continent no such school has yet been organized among English-speaking people. But the subject is no new one to rural economists in Britain. In a pamphlet published by Henry Hill, in London, in 1651, entitled "A Essay for advancement of husbandry-learning, or propositions for erecting of Colledges of Husbandry, and in order thereunto for the taking in of pupils or apprentices, and also friends and fellows of the same

Colledge or Society," is advanced not a little bearing directly upon the subject, if not referring directly thereto.

I found it this week in the Edinburgh Library of the Writers to the Signet when in quest of another pamphlet of the olden times, "The Commons Complaint," by Arthur Standlish, Gentleman, published in 1612, relative to the destruction of wood, and proposing remedies.

Some reader of the pamphlet published in 1651 seen by me—it may be two hundred years before it came into my hands—has written on the fly-leaf, "It seems to me that this essay must be the work of the ingenious Gabriel Plattes," and he cites a reference to "his own method of planting corn" in support of the supposition.

Amongst other objects which the writer considered it practicable and desirable should be accomplished for the good of the community, were the planting of orchards, the planting of gardens, and the planting of woad; but it is his argument which chiefly interested me. He writes:—

"Men take him for a foole or a madman that having store of wealth in his trunk, doth yet complain of want. What though the key be rusty for want of use? 'Tis easier to get that scoured than to obtaine such another treasure. And surely I may upon most and sure grounds say, that our native countrey, hath in its bowels an (even almost) infinite, and inexhaustible treasure; much of which hath long laine hid and is but now began to be discerned. It may seem a large boast—a meer hyperbole to say, we enjoy not, know not, use not, the one-tenth part of that plenty wealth and happinesse, that our Earth can, and (ingenuity and industry well encouraged) will (by God's blessing) yield.

"Now whereas there hath been earnestly desired (in the mean time, till the publique Magistrate shall be at leisure, to give a more strong and ample encouragement and assistance to a Design so exceedingly for the honour and advancement of the whole nation), the erection of a private Colledge or Society of good husbandry; wherein some may teach, some learne, and all practise the whole and every part of this so honourable an Art, so deep a Mystery, and that not only on the more customary and common way; but according to the most Excellent Rules, that Ingenuity and Experience gained by rational trials—and real Experiments have or can attaine to; that so the honour, wealth, and happines of this state may be multiplied even before it is aware, and the duller members thereof wonne by emulation and example to such practises for their own private and Publique Good, as no persuasion or force could ever have affectionally led them to. * * *

"It is therefore PROPOUNDED First to those whose great wealth is joined with as great Vertue and Love to their country; and Will as well as Power, to advance the Publique Good, without seeking their own Private Benefit. That whereas it is manifest that such a Colledge or Society cannot be erected without the building or buying (at least a long lease at any easy rent—if not the inheritance) of some Large and convenient House, with some good quantity of Land adjoyning and belonging to it (though this is not all the Land which must be had for this purpose); and it is as manifest that such a purchase cannot be made without good sums of Money.

"It is therefore desired that all such Well-wishers to their Country's wealth and prosperity; be pleased to contribute such sums to this good and laudable Worke as in their own Wisdomes and bounties appear necessary, and liver

the same into the hands of Mr. Samuel Hartlip whose abundant Zeale for the Publique Good renders him most worthy to be entrusted therewith till there shall be a competent stock obtained for the setting forward of this great and good Worke before mentioned : and to subscribe their Names and Sums ; that so the whole Society (when erected) and the whole Nation (when in due time they shall have tasted the sweet effects from hence proceeding) may know to whome to render all due thanks through all Ages as to the bountiful Promoters of ; by contributing to a Designe for much conducing to the good of the present and Prosperity of all ages to come : a ' Plentiful Reward to any Noble Spirit.' "

A like proposal is "PROPOUNDED, secondly, to those whose good Wills are possibly great, but their Powers lesser than the former ; and are therefore necessarily withheld from such free and voluntary contributing ; " and " (it is added) " for Security they shall have as to law the Propounder's bond ; as to Love the word of him that desires to prove himself a just and honest man, to God and man (to his utmost power) and to all Engagers a faithful Steward."

Details are given in regard to what was considered desirable in "the Colledge," and it is stated :—

" Into the Colledge also any man may enter himself as a free man, a Friend to, and Member of the Society,"

upon conditions which are stated—all of them reasonable, if the last of them be not considered exceptional :—

" Lastly, he must be a single man ; and if he shall at any time marry, he is from thenceforth to be accounted dead to the Society to all interests and purposes whatsoever ; save onely in point of debt or discovery."

For "*Husbandry-learning*," read *Forest Science or Rural Economy and Forestry*, and the author's argument will be found no less valid in our day than it was in his. The Agricultural College in Cirencester meets partly, and to a considerable extent, the desideratum of the Propounder, but it does not meet it in its entirety. But with Edinburgh University and Watts' Institute offering instruction on all accessory subjects ; with the Edinburgh Arboretum such as it may be made for the study of the natural history of different kinds of trees ; and with Epping Forest for practical training in arboriculture, all that seems requisite for a School of Forestry in that city is the organization of a class " wherein some may teach and some learn, and all practise " what relates thereto.

J. C. BROWN.

EARLY PLANTING IN SCOTLAND.

NOTHING can be more certain than that Scotland in early times was a thickly wooded country. As Sir Walter Scott has said : " History, tradition, and the remains of huge old trees and struggling thickets, as well as the subterranean wood found in bogs and mosses, attest the same indubitable fact." The names of places, which are in general the oldest words surviving in a district, and usually

describe the qualities for which they are remarkable, are unmistakable evidence of this. *Edenkellie* (wooded surface), in Morayshire, registers the fact—amply proved by the great quantities of oak found in the mosses of this parish—that the whole face of the land was covered with wood. In Perthshire, *Orchil* tells us of young wood, *Faskally* of thriving wood, and *Killiecrankie* of decayed wood. Aberdeenshire supplies *Ordiquhill*, the wood beside the height; East Lothian, *Aikengall*, the wood of oaks; and in Ross-shire *Letterchoil* indicates the wooded side of Lochduich. Dumfriesshire gives *Torthorwald*, the Tower of Thor in the wood; *Tinwald*, the ting or assize in the wood; and *Mousewald*, the wood near to the (Lochar) moss. The Darkwood, in Dumfriesshire, is *Blackshaws*. The wooded head of the Tweed is *Tweedshaws*; Renfrewshire has *Pollockshaws*; and *Pyottshaws*, the magpie-wood, is in Haddington. *Leswalt*, in Wigtonshire, suggests a wooded lea; *Eckford*, in Roxburghshire, the ford at the oaks over the Teviot; *Dunkeld*, in Perthshire, the hill of the hazel trees. In Fifeshire, *Ashkirk* indicates a church among ash trees; and *Kingussie*, in Inverness, the headland of the fir wood. *Kintore*, in Aberdeenshire, signifies the head of the forest (*doire*), and Duchallaw, in Renfrewshire, is the mount of the dark wood (*Dhu choille*).

The north-eastern extremity of "the Braes of Gleniffer," in Renfrewshire, is called *Ferneze*, the promontory covered with *firs*; and Aultgiush, in Aberdeenshire, is the *Fir-tree* (*giumhas*) brook. Of course there are Woodlands, Lochwoods, Ravenswoods, Southwoods, Braidwoods, Craigiewoods, Woodhavens, Westwoods, Stoueywoods, Woodleas, Calderwoods, and similar names almost innumerable. Nairn is suggestive of alders (*Nearne*). Beith, in Ayrshire, is derived from *Beith*, birch. Blair means a land cleared of wood, like Blair Athole, once on a time (though the Duke of Athole has since taken away this reproach), Blairgowrie, and Ardblair. These names, and many others to be found in old maps and charters, musty with years and time, show that the woods and forests of antiquity in Scotland were of wide extent and varied in their character. *Coillemore* means the big wood in the parish of Laggam, Invernessshire, where there are the remains of an old forest.

The same fact, which is borne witness to by geographical etymology, is confirmed by the evidence of the peat mosses, in almost every portion of the land. In these, from time immemorial to the present day, the remains of full-grown oaks have been dug up—sometimes whole trees of immense girth and growth, sometimes only in large or small fragments, sometimes only in heaps of acorns. Along the east coast of Scotland, running from Caithness to Aberdeen—a locality supposed to be most unfavourable to arboreal vegetation—mosses are pretty plentifully scattered, and in all these such remains

as we have spoken of are found in great abundance. An instance is on record that in the parish of Newhills, about five miles from Aberdeen, while some workmen were trenching a piece of mossy land at Crabstone, they turned up and disinterred a gigantic oak tree, the wood of which was perfectly fresh, and the trunk of which was so large and weighty that before it could be removed from its mossy bed it required to be cut into several sections. It had probably lain there for many generations. This instance is mainly noticeable because it was found in the tree-deserted portion of Aberdeenshire, where a blue-clay subsoil afforded but poor and unproductive material and opportunity for such growth. The amount of oak dug up in Scotland, at one time and another, since the extended interest in agriculture led to the reclamation of waste land and the increase of the population necessitated the spread of towns, would, it has been estimated, exceed the entire quantity which could be furnished by the whole of the timber forests at present in growth in both England and Scotland. This seems to corroborate to the full the inference made from our topographical nomenclature, that timber trees abounded in large tracts of country, from which vegetation had subsequently retired, and came to maturity in many places and in great numbers where people could scarcely, nowadays, be persuaded they would even grow, still less flourish. There can be little doubt that these woodland stretches sheltered the country, and modified its atmosphere, while they acted as protection to the crops and promoters of their healthy growth; and that they made it possible to rear in or near their ranges larger herds of swine, cattle, horses, deer, &c., than we would now be inclined to believe. Such is the benefit experienced by a country from the existence of forests in it.

Scotland, however, was for many generations exposed to depopulating internecine wars. The feuds of clansmen, the rivalries of noble houses, the revolts, conspiracies, and tumultuous proceedings of great barons against weak kings or disliked regents, the raids of border-neighbours, the incursions of islesmen, and the invasions of the sea kings of the north, all tended to unsettle society, to destroy interest in the tillage of land or the culture of timber, and the pursuits of industrial life. To these we must add the devastations made by fire and axe upon woodlands in the time of war, the results of constant consumption without corresponding care in planting, and the consequences of the short-sighted neglect of forestal plantings among a proprietary whose tenure of life and lands was insecure, and a tenantry whose chance of securing even the root or grain crops of any season was singularly uncertain. Under historic conditions such as those hinted at, and the economic fact that timber took long to mature to profit, while immediate necessities pressed heavily upon

all, it is scarcely to be wondered at, that the surface of the land gradually grew bare, and the mountain sides, loch margins, river glens, and upland reaches of the North became so denuded and waste that—

“The gloomy pine, the poplar blue,
The yellow beech, the sable yew,
The slender fir, that taper grows,
The sturdy oak with broad-spread boughs,”

showed for but little in its landscapes, and that the state of its arboreal districts almost justified the epigrammatic criticism of Dr. Samuel Johnson, on Scottish scenery, that it rarely (in 1773) presented to the eye of the traveller a tree older than himself, and he was born in 1709.

It would be wrong to assert or assume that planting had in no case and on no estate been paid any attention to, that only sporadic instances of woodlands and spasmodic attempts at timber culture were all that could be seen; but the fact is most distinctly borne out by all that we can hear and read that Scotland's woods had fallen and decayed, as might almost be inferred from the single circumstance that the tract of woodland which ran along the headland of the Tweed and on the ridges of Ettrick was spoken and sung of as “*The Forest*.”* The antiquity of Cadzow Forest is well known.

Plantations of beech have been made in the grounds at Inverary, by the distinguished family of the Dundas at Arniston, and at the seat of the Earl of Hopetoun (where the Countess of Haddington was brought up), about the time of the Revolution (1688). Planes belonging to the Reformation period are numerous, and occasional trees—chestnuts, beech, firs, &c.—planted rather for ornament or curiosity than for their use as timber, are even yet to be found.

We know that the Elder (*Sambucus nigra*), though not indigenous to Britain, was early planted in Scotland, that an infusion of its leaves afforded a sort of medicinal tea, that a conserve called elder-rob was made with the juice of its berries, and that the making of “elder-flower wine” was one of the mysteries of a Scottish lady's household chemistry. The “bourtree” buds were often pickled too, and used like capers. The long Scottish arrows of the soldiery were for the

* “The Forest of Ettrick, a tract of country containing two hundred and seventy square miles, was till Charles I.'s time reserved as a Royal Chase, and entirely wooded, except where the elevation of the mountains rendered the growth of trees impossible. In and about the year 1700, great part of this natural wood remained, yet now, excepting the copse-wood of Harehood and Elibank, with some trifling remains on the banks of the Yarrow, it has totally vanished.”—SIR WALTER SCOTT, *On Planting Waste Lands*, 1827.

most part made of elder tree. The yew, though indigenous in many parts of Scotland, was usually planted in churchyards. In 1770 there were yew trees on the island of Inch Lonaig, in Loch Lomond, 40 ft. high, and in girth from 10 ft. to 13 ft., and in the same year the great yew at Fortingall, in Perthshire, which had been twice measured by the Hon. Judge Barrington, was reported in the Philosophical Transactions to have been 52 ft. in circumference. Chestnut trees were planted as curiosities in several gardens in very early times. One of these at Finhaven, in Forfarshire, estimated to have been 500 years old, was measured in 1744, and found, on evidence attested before two justices of the peace, to be, at six inches from the ground, 42 ft. 8½ in. in girth. Another large chestnut, supposed to have been 200 years old, was cut down in 1760 at the residence of Lord Gray, at Kingfauns, in Perthshire, which was 22 ft. 8 in. in circumference, and had leaves and fruit on it in the year named. The ruins of the Priory of Inchmahome, or the Isle of St. Colme, in the Loch of Menteith, near Callander, are embosomed in trees; many of these are Spanish chestnuts which the Austin Friars planted in the days of David I., and not a few of them are, at six feet from the ground, 18 ft. in circumference. The profusion of oaks, planes, and Spanish chestnuts which clothe the northern shore of Lake Menteith add greatly to the beauty of the sheen of that splendid sheet of water. Oaks exist at Buchanan, in Dumbartonshire, which are known to have been planted about the same time as Inchmahome was built. These and other plantations, such as the row of white poplars (*Abele*), at Stevenston, in East Lothian, set in 1688 and cut down in 1770, the limes introduced at Taymouth and Inverary during Charles II.'s reign, and the fine red-wooded laburnums planted about the close of the seventeenth century at Greenlaw, in Midlothian, were rather planted for pleasure than for forestal purposes.*

Strange as it may seem, hedges were unknown in Scotland till the soldiery of Cromwell, by order of their officers, so enclosed some fields on the road leading up Inch Buckling Brae, in Haddington, the hawthorns set in which were still quick in the early part of this century; and near the old Castle of Finlarig, on the northern shore of Loch Tay, in Perthshire. These Ironside-planted hedgerows are now no more, though venerable oaks and aged ash trees and splendid Spanish chestnuts survive from a time long prior to Cromwell's invasion of Scotland.

*By the bye, it seems to be worth mentioning that among the officers of the Protector, then in Scotland, and acting as a director in the work, was Walter Blith, or Blythe, author of "The English Improver, a New System of Husbandry, &c., 1649," written in opposition to the "Discourse on Husbandry used in Brabant and Flanders," published in 1646 by Samuel Hartlib, Milton's friend.

The earliest really extensive forestal plantations purposely undertaken in Scotland were those initiated by Ellen, sister of Charles Hope, Earl of Hopetoun, Countess of Haddington, and continued by her husband, Thomas Hamilton, Sixth Earl of Hamilton, at Binningwood, on the Tynninghame estates, in East Lothian, of whose labours, as the Father of Forestry in Scotland, notice has already been taken in this *Journal* (*ante*, Vol. IV. pp. 641-649). As a specimen of the wise observativeness and shrewd sagacity of this pioneer of practical planting, his opinions on the ash seem to us worthy of quotation:—

“It is hard to be distinct as to the soil that the ash delights to grow in; sometimes an ash is seen to thrive very well on a sour, wet, stiff soil; and within two yards of it, upon the same kind, the other ashes are such bark-bound stunted things that it is a shame to see them. All this makes one wonder why some who have written about woods should lay it down as a rule in the planting of woods that every third sett should be an ash. I am sure, that if I had done so in the grounds I have planted, I should have repented it long ere now. In my wilderness and some other places they thrive prodigiously; and yet I wish I had set fewer of them there, for it is a tree that is so long of putting out its leaf that it gives a winter look to the whole field, in spite of the verdure of the other trees, though when it puts out its leaves they are of a cheerful green, and it carries them when most other trees shed theirs, though not always. It is a tree of great, almost general use; I therefore encourage it in the strips of planting between the enclosures, and that part of my woods I can get it to thrive in. They are not proper to be set very near corn-fields—the roots running within reach of the plough, and the leaves taint the grass in autumn. This tree, if carefully managed as I have directed, may be brought to a great height and largeness and value.”

Those who have seen the fine woodlands which surround Callander House, near Falkirk, may recollect that that splendid sylvan tract of land was purchased in 1783 by Wm. Forbes, ancestor of the present owner, from the York Buildings Company, who had bought it in 1720 from the Crown, in whom it had become vested by the attainder of James Livingstone, Earl of Linlithgow and Callander, and Lord Almond. This Earl, who succeeded his uncle, George, Fourth Earl of Linlithgow, in 1695, and married Anne, daughter of John Hay, Earl of Errol, joined the Earl of Mar, in his rebellion against George I., and being attainted of high treason, had his estate (which yielded £1,296 per annum in rental) confiscated in 1715. Early in that century, the fine lawn which surrounds Callander House was laid out in woodland by the Earl, to whom the beauty and glory as well as the wealth of the timber that clothes the slopes and crowns the heights

of the Callander estate are due. It is highly probable that the large rental (for the time) estimated by the Commissioners was owing to the forestal value which had then been given to the land. There can be no doubt that the improvements thus initiated on the Callander estate were both beneficial and exemplary. Sir A. Grant, of that ilk in 1719, began a series of timber-plantings on his estate, and almost immediately thereafter the Landed Proprietors of Scotland became active in the promotion of Forest-plantings. John, Duke of Argyll, Baron of Chatham, and Duke and Earl of Greenwich, born 1680, having succeeded his father Archibald (first Duke of the new creation), in 1730, though distinguishing himself in the wars of Queen Anne, won renown to himself by the woodland improvements he introduced at Rosenath, Campbeltown, and Inverary. Of the extent and beauty of the park round Inverary Castle, the richly wooded hill of Duniquoich (700 ft.), and the splendid avenue of beeches which encircle its base; of the charming glen of Essachossan, and the finely-planted pathway to it, it would be vain to speak; a poet would be needed to express the marvellous attractiveness to heart and eye of the woodlands through which the Aray flows.*

The next noble as well as notable Scottish planter was James, Duke of Athole, who succeeded his father John in 1724. He sent, it is said, the first larches known in Scotland, from London, in 1727, to Dunkeld. One of these larches, both of which had been kept in a green-house, failed; the other grew and flourished, so that in 1770 it was 50 ft. high and 4 ft. 2 in. in girth, and, when it was 120 years old, had reached the height of 98 ft. 6 in., while, measured at three feet from the ground, it gave a circumference of 15 ft. 5 in. These larches were the progenitor-trees, as it were, of this valuable timber in Scotland. Many other larches in Perthshire have exceeded this in growth, having escaped the errors in culture to which this was in its youth exposed. One tree at Dunkeld is noted as having, when fifty years of age, been 86½ ft. in height, and when cut down, to have contained 82 ft. of solid wood. When his Grace died, in 1764, he was reported to have planted on his estates 500,000 larches, but his successors, within a century, had added to the forest wealth of Scotland, and the amenity of the mountains and river scenery of their estates, more than 30,000,000 trees. In the forest lands planted round Dunkeld House, there are fifty miles of walks and thirty of rides and drives. The whole Vale of Athole is full of woodland beauty.

* There is, or at least was, when we were there, on the road to Essachossan, a curiosity in arboreal vegetation. It was a fine beech whose trunk had separated, a few feet from the ground, into two stems, and after growing apart for 20 ft. or so had reunited into one. This is locally known as the "marriage tree," and forms one of the sights, as one passes through the long avenue of ancient elms from the inn to the glen.

The Right Hon. John Stuart, Earl of Bute, who succeeded his father James, in 1723, planted largely round Mount Stuart, and made much of the island of Bute lovely with woodlands. Hugh, Lord Mauchline, and Earl of Loudoun, had begun planting at Loudoun Castle in 1730, and this was continued by hisson and successor, John, who died in 1782. James Carmichael, second Earl of Hyndford, commenced plantations at Carmichael, in Clydesdale, which his eldest son John also continued there, and at Westerhall, in the same county. The Earl of Panmure, whose title and estates were forfeited in 1715, is also among the number of those who strove to increase the sylvan stores of Scotland, and increase her prosperity by timber-culture. Andrew Fletcher, of Saltoun, advocated the forestal improvement of the land, and his younger brother, Henry Fletcher, as a good country gentleman, carried into practice, on his estate, the counsels of his less politic, if more political relative. Great value is to be attached to the example and the teaching of Henry Home, 1692-1782. He cultivated the large estate of Blair-Drummond, in Perthshire, which he inherited through his wife, Miss Agatha Drummond, of Blair, on carefully considered principles, of which he has supplied an account in his "*Gentleman Farmer*," 1756. James Anderson, LL.D. (1739-1808), who was a practical as well as a theoretical agriculturist and arboriculturist, having an estate of 1,300 acres under his care, contributed, both by writings and by the repute his success gained him, to the popularity of planting in Scotland. Dr. William Cullen, both by the trees he reared in his own lawns, at Ormiston Hall, in Kirknewton, and by the lectures which he delivered in the University of Edinburgh, on the chemistry of plant life, gave his help to the progress of the study of trees as a mode of improving lands, increasing profits, and aiding trade. A plantation formed in the parish of Colinton, 1764, on the north side of one of the Pentland Hills, which rises nearly 800 ft. above the sea level, by Mr. Trotter, of Morton Hall, was considered a piece of hazardous daring, but its complete success, and the ready sale found for its thinnings in thirty years paid its original rental, while it left in growth oaks, elms, and beeches of a value which would have paid the whole price of the land. Of other early plantings at Fingask, and Gadgirth; at Dunrobin Castle, and Errol House; at Laggan and Raehills, &c., space fails us to speak. But it is important to know that, from the low condition into which Scotland had fallen in arboriculture, she has for a long time been steadily rising, and that her woodlands, for beauty, variety, and interest, landscape loveliness and pecuniary profit, would strike with astonishment those pioneers of planting whom in the foregoing notes we have attempted to commemorate.

THE HOME FARM IN SEPTEMBER.

HARVEST WORK.—The completion of the harvest will be the first consideration, and to this everything else should give place. Late wheat, oats, and beans will probably still remain out. As the weather will probably prove fickle, it is now more than ever necessary to tie up all corn in small sheaves. Buckwheat should be well harvested, turned about as little as possible, and stacked either in small round or in narrow oblong stacks. Hemp may be pulled early in the month, tied in small bundles, and set up to dry. Cut latter-math clover seed in dry weather, and carry as soon as fit.

Potatoes should be raised in dry weather, and remain upon the ground for some time, if frosts are not expected; or they may be laid out under cover. Expose seed potatoes to sun and air for some days. Carefully sort out all affected tubers before storing for the winter.

Fruits of all kinds should be well ripened when gathered, and afterwards stored in cool, airy places.

Hops will, in some counties, demand all hands early in the month. Allow them to ripen well, and then pick quickly. Have the samples quite free from leaves and mould; never allow the hops to lie about and become discoloured in the pokes, but have them carefully handled, dried slowly, bagged warm and whole, and well stored. Too much moving about in the cooling room causes a loss of lupulin, and consequently of the aroma.

Autumn Cultivation of stubbles should go on uninterruptedly throughout the month whenever the weather permits. Steam scarifying for cleaning foul land, and early ploughing for wheat, winter beans, oats, barley, and tares, can best be done in September. Get in trifolium, and sow grass seeds for permanent pasture where the land has been properly cleaned and prepared. As rye, tares, &c., should be in during this month, early threshing will be necessary.

Live Stock.—Keep horses in good condition and ready for their heavy autumn work. Wean foals, sell out spare lambs and extra stock of all kinds not intended to be fattened, give cake or corn to fattening bullocks, run store sheep over the grattans, and keep up rape for the breeding ewes.

Dairy.—Keep cows as much as possible upon the aftermath grass, and supply them with extra food as pastures become bare.

Poultry still at large, may range the stubbles. As cold weather sets in, increase stimulating food, and use buckwheat and some cayenne.

Estate Work, as far as the horses are concerned, must be ruled by the progress of the harvest, but no opportunity should be lost of getting forward with the cartage of all materials required in planting, fencing, road-making, and draining.

A. J. B.

THE SPRUCE-GALL APHIS.

THE curious cone-like growths caused by the attack of this insect greatly disfigure the spruce firs in many of our plantations, and have appeared of late in such numbers on spruces in certain parts of the country as to cause them serious injury, if not annihilation. In crowded and neglected woods the rapid increase of the spruce-gall aphis has been particularly noticeable. In such places the spruces are often seen with many thousands of the cone-like galls upon a single tree, giving the branchlets a knotty and twisted appearance, and causing great injury to the health of the tree. Often the leader may be seen completely destroyed, or bent and cankered, by one or more of these cone-shaped excrescences, which materially retard the upward growth of the stem, and in many instances permanently injure it. On dissecting one of these "cones" during the summer, while it is still green and growing, the aphids are found in great numbers, in the cavities at the swollen base of the short spines with which the surface of the "cone" is covered. Here they are safe from their natural enemies and all artificial means for destroying them, except picking off the growth and burning them. This remedy can only be carried out to a very limited extent. In most instances where the trees attacked are but a few years old, the worst-infested ones are better pulled up and burnt, picking off and burning any growths on those left. The picking and burning should be done in the summer months, May, June, and July, while the insects are still in the galls.

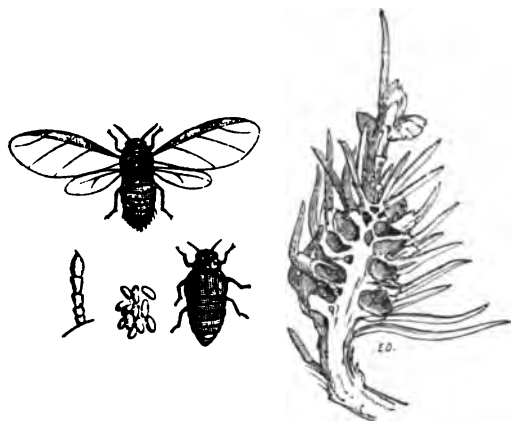
We have received so many inquiries this season about the nature and habits of this insect, that we deem it best to lay the latest information concerning it before our correspondents, in the following extract from the recently-published "Manual of Injurious Insects," by Miss E. A. Ormerod, F.M.S., to whose kind courtesy we are indebted for the use of the illustration.

"The Spruce-Gall Aphis, known also as the Spruce *Adelges*, or Spruce *Chermes*, causes the small bright-green, or green and rosy, galls, shaped like miniature Pine-Apples (or somewhat like Scots-fir cones furnished on each of the divisions with a short leaf), which may be found not unfrequently in the early summer forming at the ends of the shoots of the Spruce Fir.

"The mother *Chermes*, from which the brood of the year originates, is very similar in shape to that of the Larch, but rather smaller, oval, wingless, and woolly, of various shades of green or purple, with dark legs, and may be found in the spring with her sucker inserted in the base of a Spruce bud, thus causing the irritation which starts the diseased growth known as the 'Pine-Apple Gall' or 'Pseudo Cone.' Sometimes the shape is perfect, but often only one side of the shoot is swollen, and the other is merely stunted.

"The first growth of the gall and the first egg-laying of the *Chermes* begin in May, or sometimes in the latter part of April, and deposit of eggs goes on slowly, the *Chermes* never stirring from the spot during the time, till, having laid a mass

amounting to about two hundred, of various tints of yellowish green or grey, covered with wool from her own body, she dies.



WINGED FEMALE, PUPA, EGGS, AND HORN, ALL MAGNIFIED. SECTION OF *Chermes* GALL IN DRIED STATE, AFTER DEPARTURE OF *Chermes*.

"The larvæ, which hatch shortly from these eggs, are mere specks in size; when magnified they are seen to have six legs, and a head with horns, and to be in shape much like the pupa figured above (at first without signs of the future wings). The colour is greenish, or of a red tint. Meanwhile the growth of the gall—the 'pseudo cone,' as it is called—has been continuing, and the young *Chermes* larvæ spread themselves, soon after hatching, on its surface, drive their suckers into the soft substance of which it is formed, and, according to various observers, become buried in it from the continued enlargement of the base of the unnaturally swollen leaves, of which the gall is chiefly composed, gradually overlapping them. This point is one of much interest. With regard to the larvæ that were hatched outside presently becoming tenants of the inside of the gall, there is no doubt, but according to my own observations after long and careful watching of the growing specimens, I believe that at a certain stage of the growth of the gall, a minute slit opens along the upper part of the sutures that mark the divisions of the swollen leaves of the gall from each other, and through these openings the larvæ creep into the chambers within.

"On this point inquirers may satisfy themselves by watching the *Chermes* galls at hatching time, with the help of a strong magnifying glass, especially on the afternoon of a sunny day, and noting (should the process coincide with the above observations) the larvæ spread themselves along the lines which divide the galls into diamond-shaped scales, apparently piercing into them with their suckers, and then disappearing into the chambers of the gall. When the 'pseudo cone' has reached its full growth, which may be in four to six weeks, it hardens, the cells split open, and the contained young *Chermes* come out in numbers. The pupa are powdery, lead-coloured, and margined with greenish at the sides from the indications of the tint of the coming wings. When fully developed the skin cracks, and the perfectly-winged insect appears—figure magnified above—the natural length, at rest with the wings folded, is about the eighth of an inch. The colour is of a yellowish green, with whitish green wings, transparent green legs, and five pointed horns, also of transparent green; sometimes the colour of the insect is reddish.

"The winged females disperse themselves and begin to lay, and soon may be

found dead by their little heaps of twenty eggs. 'The larvæ which hatch from this second deposit of eggs are, in the next spring, the mother *Chermes* of the attack of the current year.' (E. L. T., Prak. 'Insecten-Kunde,' 'Forst Zoologie,' *Gardener's Chronicle*, E. A. Ormerod, &c.)

"PREVENTION AND REMEDIES.—When spruce trees in young woods are much infested they should be felled, and, if cut down in summer while the galls are green, all gall-laden shoots should be cut off and burnt. In winter this precaution is not needed, as the old galls are empty, and, if the mother *Chermes* should lay on the felled shoots, the buds would not develop enough to nurse up the young brood. This clearing of mature much-infested trees is very important; cure is hopeless when they are in this condition, because whilst each year they become more unhealthy under the attack, they form centres to spread the *Chermes* all around.

"Where young trees only a few feet high are attacked, it is desirable to go over them, and remove the galls *carefully*, so as not to bruise or tear the other shoots, and it is well to do this as soon as the galls begin to show. The sap that would have gone to the distorted growth is thus preserved for the healthy shoots, and hatching of the *Chermes* out of the galls is prevented. When growth is more advanced their removal is best performed by a man furnished with an apron with a large pocket; into this each gall should be put as it is cut, and the collection should be most carefully destroyed. An apron is more convenient than a basket, which requires the use of the second hand; but if the galls, save in their earliest stages, are merely thrown to the ground, the *Chermes* will develop within, and probably be in no way checked by the operation.

"How far soil and situation affect the amount of attack does not appear to have been fully noted, but probably they have the same influence as in other cases of *Aphis* attack. The worst instances of gall presence that I have seen were on trees about thirty years old, which were somewhat overcrowded and in a damp locality, on a cold, stiff clay; and also, *after removal*, on some fine young trees about three or four feet high, which had been planted in a space in a fir wood so sheltered by the neighbouring trees and hedges, and also by long rough grass and weeds, that there was no free play of air.

"Where there are only a small number of young trees to be attended to, drenchings with any of the *Aphis* washes in July, or when the *Chermes* were seen to be hatching, would be useful in clearing many from the trees."



PETRIFIED FORESTS.—We quote the following from an American gardening magazine :—"In 1871 the petrified remains of a forest of redwood, oak, and other trees, thrown up from a lower level by volcanic action, and deeply imbedded in tufa, still with many portions of trunks some feet above the surface, were still to be found midway between Golden Pass and the Ute Pass, in the Rocky Mountains. It is now said to have disappeared, at least so far as anything is to be seen above the surface. It is said that another of these wonderful pre-historic series of remains in Sonoma, California, is fast disappearing before the zeal of relic-hunters. It is to be regretted that these wonderful remains of the mysterious past could not be preserved, and it may not yet be too late for the State to do something towards that end. The one in Colorado must have been buried very deep by the volcanic dust, as at the time referred to one of the trunks was hollow, and a string and a stone at the end was let down and found to go many feet beneath the surface. No doubt if this old forest could be dug out to the original surface of the ground many interesting relics of plants and animals might be brought to light."



ENGLAND.

PUSH forward all woodland work in situations where the disturbance of game is not a material consideration. Trim hedges and rides, erect fencing, make roads, lay down clearance roads, and make preparations for the allotment, measurement, and sale of underwoods. Collect tree seeds as they ripen, sowing the birch at once, and storing those likely to suffer from spring frosts.

In open weather towards the end of the month transplant evergreens, watering and mulching when necessary. Continue layering in plantations and nurseries. Examine young plantations, and prepare by pitting or otherwise for filling up. Look out nursery plants, according to requirements, and purchase early.

By the end of the month some of the larger deciduous trees may be transplanted, especially such as have been prepared by opening out and trenching round them. In getting up and during removal great care should be taken of the newly-formed fibrous roots, as well as of the head and the bark. Careful handling and slow removal will be necessary to the preservation of the roots and the adhering soil. Before the tree is lowered into its new site the soil should be well consolidated to give it a firm bed. Well arrange the roots by hand, and cut off all lacerated ones. Throw in fine soil among the roots, and pour on water when necessary. Mulching in dry weather, and especially with cold drying winds, will be a valuable aid to the trees.

Deciduous trees for which the ground is not quite ready may with advantage be taken up and laid in by the heels upon warm, fairly dry, and sheltered borders.

In the nursery, hoeing, trenching, and general preparations for transplanting may continue, as well as the formation and turning of composts. Collect all refuse, and mix with lime or fermenting manure, according to requirements. Some of the smaller evergreens may be raised, and seedling hollies and oaks removed at once.

While dry weather continues wash the stems of young trees likely

to be injured by rabbits. Stockholm tar, nightsoil, or cow-dung, and a little lime applied thickly with a brush will probably be found as efficacious as the bullock's blood of which rabbits are supposed to have so great a dread.

A. J. BURROWS.

Pluckley, Kent.

SCOTLAND.

CONTINUE the pruning, thinning, and clearing of young plantations as formerly recommended. Thin young copse-wood, being careful to leave a good stock of the strongest and best shoots. Look over all plantation drains and remove branches or other accumulations that may obstruct the free flow of the water.

Complete the preparation of ground for autumn planting; autumn planting is preferable to spring planting, and should be resorted to in all favourable situations.

At this season of the year, and later on, sheep are generally put in low ground pastures; it is therefore necessary to have all plantation fences in good order, particularly those around recently-formed plantations.

In various localities a good deal of low heathy land might be converted into thriving natural woods, if the ground were well fenced against sheep. This is a mode of reproducing and increasing woodland areas which does not receive the attention it deserves. In not a few places nature is to be seen struggling for an existence, and requires only a little assistance in the way of fencing, draining, &c., to produce thriving and profitable woodlands.

Complete the cutting and dressing of hedges, and clean about their roots where necessary. Prepare beds for new hedges, and plant those of holly or other evergreens during the month. Underwood of holly, laurel, &c., may also be planted, always preferring moist weather.

Complete the insertion of cuttings of all plants propagated by that means.

Weed and hoe in the nursery, and dig between the rows of evergreens and other plants where space will permit. Transplanting into the nursery rows of seedling holly and young evergreens may now be executed. Turn compost heaps, clean walks and policy grounds, and complete the cutting and cleaning of shooting rides. The seeds of birch and sycamore are generally ripe this month; although the season is late they may be collected about the end of the month. If collected in a damp state they should be well dried in an airy loft before being stored up.

Darnaway, N.B.

D. SCOTT.

IRELAND.

THE forester having now got his oak bark all off his hands, ought to turn his undivided attention to the preparing of ground for planting. Enclosing and draining should be done without delay, so as to have the ground ready for an early start at planting. Autumn planting always proves very successful in Ireland, and no opportunity ought to be omitted of doing as much as possible.

Clean out shooting drives and head down overgrowth in rocket coverts. Finish as early as possible all work in game covers, as the birds will now be roosting on trees, and should not be much disturbed. Look over the entire system of drainage, removing all obstructions from them, and the same to open water-courses. Repair roads and fences of all kinds. Begin clipping farm and other hedges. Transplant evergreens of all kinds, and should dry weather continue, water the newly-removed plants freely.

Towards the end of the month ground works may be started, as for instance new avenues or underground draining.

D. SYM SCOTT.

WALES.

As many of the workmen as can be spared from the woods and domains are now engaged at harvest operations. The clearing, draining, and fencing of ground to be planted during the coming season, should be continued as the men return from the harvest. Clean out open drains and ditches, and see to the outlets of covered drains.

Where it is intended to plant new hedges, a good bed should be prepared to receive the young plants, by trenching to the depth of at least two feet.

Continue the switching of thorn and other hedges, and clear and burn up the refuse as the work proceeds.

Hardwood trees and shrubs may now be pruned, care being taken not to use the knife too freely.

The present month is a good one for making alterations and improvements in the pleasure grounds; evergreen trees and shrubs may now be planted with success, provided care is taken to have good balls of earth with the roots. Turf-laying may also be performed during this month. As the ground is now moist it is likely to take root before frost sets in. Walks and drives may also be attended to, by gravelling, &c., and they, together with lawns, should be well rolled.

LEWIS BAYNE.



THE Scottish Arboricultural Society's excursion to Morayshire at the beginning of last month was a decided success, and great credit is due to the local committee, of which Mr. Scott of Darnaway acted as Secretary, for the general excellence of the arrangements. Two more enjoyable and instructive days cannot well be imagined, and the wonder to us is that these excursions are not more largely patronized by local tree-lovers. We are sure the Society would extend a hearty welcome to visitors.

* *

Full particulars of the arboricultural "lions" (we do not refer to the famous "Forres lions"), visited by the Society as a body, will be found in the illustrative descriptive article in another part of the *Journal*, but several members prolonged their stay in the North in order to inspect other points of interest. One small party paid a flying visit to Dunrobin Castle, whilst another inspected the fine fir plantations at Darnaway (which time hardly permitted the Society to glance at), and explored the magnificent scenery of the Upper Findhorn. The Duke of Richmond's splendid seat, Gordon Castle, and the town of Elgin, with the exquisite ruins of the cathedral were also visited, and everywhere the same hearty welcome and kind hospitality were extended.

* *

The annual dinner in connection with the summer excursion of the Society took place in Warner's Hotel, Forres, on the evening of Tuesday,

2nd August, Robert Hutchison, Esq., of Carlowrie, occupying the chair, and Dr. Cleghorn, of Stravithie, acting as croupier. Among the company were Messrs. Morrison, Elgin; Gossip, Inverness; Dewar, Beaufort Castle; McGregor, Ladywell, Dunkeld; Baxter, McCorquodale, and Kidd, Dunrobin; Grant Thomson, Strathspey; Scott, Darnaway; McCorquodale, and McKinnon, Scone; France, Penicuik; W. H. Rider, *Journal of Forestry*, London; McLaren, *Secretary to the Society*; Sim, Forres; McLaren, Altyre; Robertson, Panmure; Kennedy, Glen Urquhart, &c. After the dinner, a very enjoyable and harmonious evening was spent, with the usual toasts and songs.

* *

At Forres we took the opportunity of a walk through the well-known nurseries of Messrs. Grigor & Co., out of which many millions of healthy and vigorous Scotch firs and larch plants have been sent, and where there is at the present time a very large stock of thriving young plants. At Elgin we were very pleased with our visit to the extensive nurseries of Messrs. R. & A. Morrison, where there are upwards of forty acres devoted, for the greater part, to the growing of Scotch fir and larch, and about which we shall have something more to say next month. There can be no doubt as to the true native Scotch fir being found here in all its native vigour—indeed, the whole of the stock bore the traces of careful management, and was, almost without exception, making fine vigorous growth.

Travelling northwards by the Highland Railway, the eye of the arboriculturist is quickly attracted by the great number of seedling trees which are seen springing up on the protected slopes of the cuttings and embankments of the line. Soon after leaving Perth these self-sown trees and bushes appear in great plenty, especially about the entrance to the Grampians, in the neighbourhood of Dunkeld. It is not, however, till the summit of that grand mountain range is passed, and the traveller is rushing down its northern slopes towards the forest-clad valley of the Spey, that Nature-sown trees of the Scots fir burst upon the view in all their natural irregularity and rugged beauty. On the steep slopes of the railway cuttings are everywhere to be seen abundance of seedling firs; the varying height of them indicating an age from within a year or two of the time the railway has been made, down to the seedling of the present year just rearing its tiny head among the dry shingly soil. The position is natural to them, and points out a ready means of extending our pine forests by natural means, where at least the soil and climate are favourable. All that has been done is simply exposing the soil to the natural action of the sun and air, upon which the fir seeds wafted from the neighbouring forests find a proper germinating medium, and the railway fences afford a thorough protection from the raids of destructive animals. Thousands of acres of bare land in many parts of the country could be cheaply converted into valuable forests, if only *thoroughly protected* from the inroads of animals, and a slight assistance given to Nature in preparing the ground, and seeding it when necessary.

* *

We understand that during the present month Colonel Pearson will accompany some of the students from the Forest School of Nancy on a visit

to some of the large natural forests and plantations in Scotland. It is whispered that one of the objects of this expedition is to test by actual observation what facilities exist in the Scotch forests for imparting to Indian forest students that practical knowledge which they are at present obliged to go to continental institutions to acquire. We trust that this rumour may prove to be correct, although we almost fear it is too good to be true.

* *

Dr. Franklin B. Hough, commissioner of forests under the Government of the United States of America, is at present on a tour of inspection of all schools of forestry, experimental plantings, and extensive plantations in Europe. He paid a flying visit to Scotland and England, and proceeded thence to Denmark, proposing to go on to Norway, Sweden, Finland, Russia, Poland, Hungary, Austria, Bavaria, Wurtemberg, Hesse, Switzerland, Prussia, Hainault, France, Italy, and Spain.

* *

Complaints of tree blight still continue to reach us. In Cheshire and Lancashire the attacks have been very severe, and not confined to any particular species of tree. The foliage of elms, oaks and sycamores appear, however, to have suffered the most.

* *

The fate of the plane tree in front of the South Kensington Museum seems to be still undecided. Since we mentioned the subject last month we have received a reply from the Lords of the Committee of Council on Education, stating that the question will come before their lordships when the future of the new museum buildings is under consideration, but that at present there is no information that could be given on the subject which would be of interest to the public.



EFFECTS OF THE SEASON ON SPRUCE.

SIR,—Will you kindly tell us what is the matter with the enclosed sample of young spruce? There are a good many thousands of plants in the same break, and they are all affected in the same way, the young leaves turning brown or red. The ground has never been cropped with forest trees before.

S. M. & A.

[Your spruce plants show the effects of cold nights, combined with dull and wet weather, on the growth of the season. It is not rare this year in damp soil or cold spots. The plants will probably soon lose the discoloured foliage.—Ed.]

DAMAGED LARCH PLANTATIONS.

SIR,—I dare say it may interest you to hear further of damaged larch plantations. It interests me very much, because I am a fellow-sufferer with "J.," who writes an account on page 130 of what his Dartmoor larch have suffered.

The plantation that I have in mind is in Breconshire, situate on a dry bank facing S.W., and of about twenty years' growth. These trees were growing very well, but a fortnight ago, when at home, I went to see them, and found almost every tree "black," with a green shoot here and there. Leaders and branches are equally affected. The whole plantation is but small. I examined others near, but there was not one that was similarly injured, though I cannot say that any other of our plantations has a similar aspect,

though many are on higher elevations than this one, which is about 800 ft. above sea-level. Are they likely to recover?

H. PENRY POWEL,
Of Castle Madox, Breconshire.
New York City, U.S.A.,
July, 1881.

DISCOLOURED LARCH.

SIR,—I enclose two or three small branches of larch to show how my plantations here are, to a large extent, affected. The leaves of this year's shoots have become quite red, and the effect is that the whole of the plantations have a brown tinge. Can you explain the cause of this? I am anxious to know whether it is a common occurrence or not. It is only during the last fortnight that the plants have become blighted. The plantations extend to about 1,300 acres, and are all four and five years old, and they have thriven admirably hitherto. The season hitherto has been excessively wet in this district, and I have thought that that may account for it. All the plantations are on steep slopes, and on ground highly suitable for larch.

G. M.

August 1, 1881.

[The discoloration of the leaves of young larch, as described by our correspondent, is not uncommon this season. We have observed it in several nurseries and young plantations in Scotland, and the cause appears to be reasonably attributed to the coldness of the nights and the wetness of the season. In the north the summer has been cold and wet; and in low-lying places and on cold, sour soil, the foliage of the

young larch plants is often seen affected in this manner. What the result may be we are unable to foretell, but the loss of most of the discoloured foliage at an early period is likely, and the consequent immature state of this year's shoots will be slightly against the progress of the trees. With the return of more genial seasons no permanent injury, we think, need be feared, but the drainage of affected spots should be seen to, as wetness at the roots, with a cold atmosphere, seems to predispose the young larches to assume this unhealthy-looking colour. —ED.]

TIMBER SALE AT LONGLEAT.

SIR,—Enclosed is our catalogue of annual timber sale, to which you will find the average prices realized, also the average size of the different sorts of timber. The timber trade is still dull. The sale, however, was very satisfactory under the circumstances. Oak slightly lower. Ash in demand and fetched a little more than last year. Beech not brisk, about the same as last year. Fir timber cheap. Saplings and poles sold remarkably well, and fagots fairly well.

OAK.—264 trees=3,530 feet, average 1s. 5½d. per foot.

ASH.—44 trees=474 feet, average 2s. 2d. per foot.

BEECH.—58 trees=1,970 feet, 7½d. average.

BEECH.—One windfall and two dead trees (standing), £2 10s. 0d.

SWEET CHESTNUT.—9 trees=100 feet at 11½d. per foot.

LARCH.—42 trees=410 feet at 12½d. per foot.

SPRUCE.—37 feet at 6½d. per foot.

SCOTCH SPRUCE AND SILVER FIR.—1880 feet at 6½d. per foot.

SCOTCH SPRUCE, SILVER FIR, AND WEYMOUTH PINE.—4,005 feet, average 6½d. per foot.

SPRUCE FIR, 330 feet at 6½d. per foot.

TWELVE OAK AND OTHER SAPPLINGS, 6s. 5d. each.

152 OAK SAPPLINGS AND POLES at 2s. 2d. each.

51 SAPPLINGS AND POLES at 8s. 3d. each.

214 LARCH POLES at 2s. 8d. each.

SCOTCH SPRUCE AND SILVER.—195 poles at 2s. each.

OAK-TOP FAGOTS.—1,800 fagots at 18s. per hundred.

ASH-TOP FAGOTS.—300 fagots at 17s. per hundred.

Valuation before sale £652 6s. 4d.
Total sum realized, £692 1s. 6d.

Yours faithfully,
GEORGE BERRY.

WHIRLWIND AT BRAMHAM PARK.

SIR,—As it may be interesting to the readers of your *Journal*, I send you a few particulars of a whirlwind which happened on the 31st of July, at Bramham Park, the seat of George Lane Fox, Esq., near Tadcaster. I went to see the place on the 5th of August, and was much impressed with the scene of desolation. A group of fine trees, principally beech, standing on the edge of a dell in the East Park, near the corner of the pleasure ground, has been nearly demolished, the trees mostly blown out of the ground, but many broken by fallen trees, or the force of the whirlwind itself. A beech standing, but denuded of most of its branches, measured 13 ft. circumference at 4 ft. up. A beech on the ground was 12 ft. 8 in. in circumference at 4 ft.

From this point the tornado has followed the ravine downwards, sparing one short row near by, and then taking all the trees for some distance; thorn bushes of a foot diameter have the tops twisted off, and blown 20 yards away.

A wych elm, 9 ft. circumference at 6 ft. up, blown down; the base of the tree spread out to 8 ft. diameter, as is not uncommon with the wych

elm; the hole made in the ground was about 18 ft. diameter, and $3\frac{1}{4}$ ft. deep; height of tree about 60 ft.; soil light, with broken pieces of limestone.

About this point the whirlwind has divided, one part ascending a hill and destroying many old thorn bushes, either blown out of the ground or broken off, and many large branches of oak, &c.; ascending a higher hill in the West Park, its course may be traced by some lime and beech lying prostrate; they are bushy trees of fifty or more years' growth.

The right-hand part of the whirlwind has kept down the hollow, and has luckily passed a very fine beech, $16\frac{1}{2}$ ft. circumference at 4 ft., and about 85 ft. high, which has been previously damaged by a falling tree.

The next instance of damage is a large branch of an ash twisted off.

Further down a beech, partly decayed at root, and another very fine one have been thrown across the hovel where the horses were. The top branches have fallen into a large oak, which has prevented it reaching the ground, at a serious cost to itself, in the way of branches. Beyond this the wind met with spruce and other smaller trees, which have been snapped off at various heights. At the corner of Bramham Biggen (Lord Headley's), a tall beech has had the branches cut off as by a horizontal line, and another those off one side.

The trees in Lord Bingley's walk I did not see. I suppose there were fifty trees on the ground, besides thorn bushes.

I am told the whirlwind that caused this damage lasted two or three minutes, and is supposed to have originated in a hollow east of the East Park.

I am not sure of the date (July 31)—it may be the 24th, on which day many other trees were blown down

in this neighbourhood, and a short storm occurred here about 6.30 p.m. and lasted half-an-hour.

I am, yours sincerely,

GEORGE CRADHALL.

Burton Croft, York.

VAGARIES OF THE FERN TRIBE AND POPLARS.

SIR,—It was a great consolation to me to learn from your number for this month, that ferns were failing in Shropshire as well as in the neighbourhood of London. Nothing could have done better than mine did in the month of May. They came up strong, in their grey frowey *scrolls*, which rapidly unfolded into graceful leaves. I made sure I was going to have a fine show of them in the open ground.

Lo, and behold, when June came they halted, and declined to proceed any further, in spite of watering and manuring. In July they turned rusty, and some of them died back to the root. They became an eyesore, and all our care and consultations over them were wasted, and had no perceptible effect on them. I had half a mind to root them up, and throw them on the mixen as useless weeds. All at once, about a week ago, I observed there were new and delicate shoots again coming up, of a beautiful pomona green. I then cut away the old *branches* (for so they may be called), and they are already forming pretty plants, just as if it were May, instead of the middle of August. When I called my occasional gardener's attention to their late shabbiness, he told me it was general all about this neighbourhood. So I suppose is the revival, of which I may have something to say at the end of the season.

A few words more, while I have the pen in my hand. This has been a trying summer for established trees, but how about new plantations? I have found it very difficult to keep mine growing, and they have done

very little, especially the evergreens that were transplanted last fall, and afterwards greatly cut up by frost. A small poplar moved rather early seemed disinclined to give any signs of life, but in June it put out a shoot or two, very low down, so I adopted the first Mr. Cobbett's plan, which he declared was uniformly successful. I cut it down to within two or three inches of the ground, where it was sprouting; but instead of this doing any good, the leaves withered away. The tree was not above an inch in diameter, therefore a very fair size for the experiment. Lord Bacon says, "a mixture of a lie doth ever give pleasure," meaning, I take it, that the truth, a little embellished, improves a narrative—which Horace before him authorized — "*Ficta, voluptatis causa, sint proxima veris*," which is prettily rendered by Creech —

"Be sure, whatever pleasant tales you tell,
Be so like truth, that they may serve as
well."

But this was advice to the poets. He who professes to state a fact for our guidance in arboriculture, has not the same excuse for departing from it.

Other young trees that I headed back to 4, 5, and 6 ft. have shot out fairly well, but those in the shadiest places, and least exposed to sunshine, have done the best.

The Italian poplar is a free-growing tree, but it won't bear pollarding, unless some woody branches, or a leader or two of some size, be left to help to draw away the sap, when it rises fast. If it has to vent itself in small sprigs, all round the trunk, these are apt to die off, while still herbaceous, and the sap will either rise no more, or so feebly the following year, that the tree is doomed; yet a limb or top, cut and trimmed in December, forming a pole or post as thick as one's leg, and 10 ft. long, if it be planted a foot deep in March, and well supported, will strike, and throw out a branchy

head, which will form a pretty tree the same year.

This is the experience of, Sir,
your sometime correspondent,

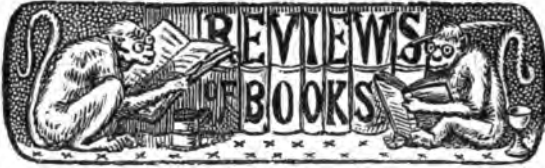
A DESULTORY FORESTER.

Wormwood Scrubbs,

Aug. 15, 1831.

OUR PUBLIC GARDENS.

A WRITER in the *Field* says:—
If a country gentleman thinks it worth his while to have a nursery to supply his estate, and finds it work well, surely it would be worth while for a city like London to have a large one for the supply its own trees, shrubs, and flowers. The waste that goes on now may be judged by the fact that some of the trees on the Thames Embankment cost nearly a pound apiece, while they could have been raised in a State nursery for a couple of shillings. The worst of this thing is, both in public and private gardens, that once the habit is established of buying, it becomes a settled one. We fear, although one hardly likes to say it, that things are sometimes bought whether they are wanted or not. So long as the system of commission exists, this will be the case. It probably accounts to some extent for the planting of things that have not the slightest chance of succeeding, and which perish annually, in public gardens as well as in private. In Paris, where no expense has been spared in public gardens, extravagance has been avoided in this direction by the establishment of a series of nurseries for the supply of the gardens of that city. Spots of ground are selected, fitted for the work in various ways, one place for evergreen trees, one place for street trees such as our planes, another for the hardy flowers, and another for the bedding plants, and so on. Similar establishments in London would be of the greatest interest and utility for London gardens.



Wood Magic. A Fable. By Richard Jefferies. (Cassell, Petter, Galpin & Co., London.)

Some few months ago we had the pleasure of directing the attention of our readers to one of the latest works of Mr. Jefferies, "Round about a great Estate," the perusal of which, we have no doubt, has proved a source of immense pleasure and instruction in many a country house. The book which we have now to notice, although written in a very different style to the more practical work referred to, bears a strong resemblance to it, and to Mr. Jefferies' other writings, in the intimate acquaintance with rural affairs, and the strong love of Nature in all her most beautiful forms, which is perceptible in almost every page of it. Whether it be trees, insects, birds, the sky, or the earth itself, of which Mr. Jefferies writes, he shows himself a thorough naturalist and a keen observer.

"Wood Magic" is a fable in which the adventures of a country lad, "Sir Bevis," are followed, and the magic, we suppose, consists in the marvellous and agreeable faculty with which he is endowed, of being able to understand the language of the birds, the insects, the animals, and all living things, and to converse with them all in their own tongues. The bees are his messengers, the hare his guide through the woods, and the squirrel his friend and companion; the brook discourses on things past and present for his edification, whilst the whole tribe of birds afford him, by their schemings and quarrelling, a constant round of amusement. It is indeed around the internal revolutions and the foreign invasions of the bird kingdom that the plot, if

we may so style it, of the story is centred, and "Sir Bevis" is good enough to translate for the benefit of less favoured mortals the language of the feathered tribe of which we hear so much and understand so little.

Kapchack, the magpie, it appears, is the king over everything and everybody, "over the fly and the wasp, and the finches and the heron, and the horse and the rabbit, and the flowers and the trees." He is a very mighty monarch, a regular autocrat in fact, and although a miserable object to look at, with the feathers out all round one eye, and his beak chipped and worn, he is very wise, and lives in a fine nest up an old apple tree where no one is allowed to go. Things went off tolerably smoothly in spite of Kapchack's occasional vagaries and cruelties, until this toothless old monarch proposed to contract an alliance with La Schach, the youngest and most beautiful jay in the wood. This aroused the indignation and jealousy of the whole tribe, and led to a large amount of revolutionary scheming, the progress of which, together with the alarming invasion of the country by the mighty Choo Hoo, emperor of the wood pigeons, are fully related in the course of the two volumes.

Of course it will be understood that these incidents are only the *media*, as it were, through which our author imparts to the reader, in his own delightful style, a variety of information and instruction on some of the most beautiful of Nature's hidden workings. The weasel got shut up in a hole by a large stone falling over the entrance, and being in great distress communicated his

tale of woe to a passing cricket who enlisted the sympathies of his friend the rat for the unfortunate captive. "The rat," remarked the cricket, when communicating the success of his efforts for his release to the imprisoned weasel, "has brought a little piece from a fungus, and has scratched a hole beside the stone and put it in there. Now, when this begins to grow, and the fungus pushes up, it will move the stone and open a chink. In this way I have seen my lord the rat heave up the heaviest paving-stones, and make a road for himself."

Those who are aware of the peculiarity belonging almost exclusively to the elm of dropping large and apparently sound branches at times without any warning, will find this fact prettily recognised in the following conversation between Bevis and the squirrel. Bevis having ridiculed his friend's warning not to take his seat under an elm, and having expressed his opinion that the elm could not harm him, is thus reproached:—

"You are very much mistaken; that is a very malicious elm, and of a very wicked disposition. Elms, indeed, are very treacherous, and I recommend you to have nothing to do with them, dear."

"But how could he hurt me?" said Bevis.

"He can wait till you go under him," said the squirrel, "and then drop that big bough on you. He has had that bough waiting to drop on somebody for quite ten years. Just look up and see how thick it is, and heavy; why, it would smash a man out flat. Now, the reason the elms are so dangerous is because they will wait so long till somebody passes. Trees can do a great deal, I can tell you: why, I have known a tree, when it could not drop a bough, fall down altogether when there was not a breath of wind, nor any lightning, just to kill a cow or a sheep, out of sheer bad temper."

"But oaks do not fall, do they?" asked Bevis, looking up in some alarm at the oak above him.

"Oh no," said the squirrel; "the oak is a very good tree, and so is the beech and the ash, and many more (though I am not quite certain of the horse-chestnut, I have heard of his playing tricks), but the elm is not; if he can he will do something spiteful. I never go up an elm if I can help it, not unless I am frightened by a dog or somebody coming along. The only fall I ever had was out of an elm."

Here and there, too, we find a quiet "thrust," which the careful reader will have no difficulty in recognising. As an example, the squirrel, when asked to convey an unpleasant message to the king, excused himself on the ground that he never meddled with politics, and that he could not depart from his principles. "His principles," muttered the crow, always a cynical fellow, "are his own beech-trees: if anybody touched them he would not object to politics then."

These few examples—and we wish we had space to give more of them—will serve to illustrate our meaning, when we say that in this book there is a good deal to be read "between the lines," and many a close observer of nature will find his own pet theories and the facts which he learns in every country walk or ride, come cropping up here and there, sometimes, it is true, dressed in such novel and pretty guises that he will hardly know them. Differing from some reviewers, we do not regard "Wood Magic" as a book for children, but rather as a literary treat for maturer folk: it is just one of those books that will be enjoyed in the proportion that the reader is acquainted with the beauties of Nature, of which Mr. Jefferies writes so lovingly and so well.

We have received the August part of the *Florist and Pomologist*, a pictorial magazine of flowers, fruit, and general horticulture. Two plates

are presented, finely executed in colour and style. The one represents several forms of *Sarracenia* in the flowering state, showing the flowers to be of remarkable beauty. In the second plate there are two specimens, very tempting to the eye, of the *Duchess of Oldenburg* apple, a handsome early fruit. The magazine in general is interesting and attractive, an article "On Perfection of Form in the Tulip," another on "Weeping Willows;" a report of the Pelargonium Society's Exhibition, and a lecture delivered on "The Carnation," forming part of its contents.

OUR FOREIGN EXCHANGES.

IN the *Revue des Eaux et Forêts* are given an account of the third International Congress for the discussion of Agricultural and Forest Economy, which was held last year in Vienna, and a translation of a paper which appeared in the Italian *Nuova Revista Forestal* on the plantations of Eucalyptus in Italy to counteract malaria. The latter has already been noticed in the *Journal of Forestry*, and a translation of it has been prepared for publication in *extenso*.

There has been published in Italy by Sr. Perona, Sub-Inspector of Forests, and Professor in the Forest Institute at Vallombrosa, a treatise on Sylviculture,* designed as the first part of a large work which may complete the instruction of young foresters in the fundamental principles of the forest economy of the day.

In the opening chapter the author brings under consideration the nutritive and reproductive operations of vegetables, and indicates what is the action on these of light, and heat, and air, with the relations which

subsist between climate, soil, and ligneous plants. The second chapter treats of means of creating woods on ground which has been cleared or is devoid of trees. The different modes of sowing and planting are described with great detail, and in this chapter are described the process of reboisement for the extinction of torrents, and the planting of "dunes" to arrest drifting sands, citing largely the treatise of Demontzey. The third chapter is devoted to the study of woods in view of their influence on vegetation and the fertility of the soil: it treats of thinning, partial clearings, and means of preserving the soil from erosion. The fourth chapter treats of what requires attention in the regeneration of woods, including what is technically known as the fundamental principles of *possibility*, or amount of produce which a forest may yield according to what is desired, and *exploitability*, or time and mode of exploitation appropriate to each case; and the different modes of treatment to which forests are subjected; and the fifth chapter treats of the culture of forests in which the trees are irregular in growth, and of different means employed to secure regularity.

The *Revue des Eaux et Forêts* in noticing this work intimates that the author has condensed in this single volume all that has been written on sylviculture by the most eminent foresters of France and Germany, and has not only skilfully compiled the views of high authorities, but has made their views his own, and presented them in a way which gives to his treatise all the characters of an original work.

La Gaceta de la Industria of Spain states what will probably be news to some of the readers of the *Journal of Forestry*! It reports:—"The Americans are projecting a work exceeding in magnitude any which have hitherto been dreamed of. They propose to unite America to Europe by a railway tunnel along

* *Trattato di Selvicoltura del Sottispettore forestale Vittorio Perona insegnante nel Instituto di Vallombrosa. Vol. I. Selvicoltura generale. Tip. Bencini, Firenze, V. dei Pandolfini 20.*

the bottom of the Atlantic Ocean. The tunnel will be formed of an iron tube 5,600 kilometres in length, and 8 metres in diameter. To enable it to resist the pressure to which it will be subjected, the tube is to be 50 centimetres thick, and in sections 50 metres in length. Detailed information is given in regard to the proposed operations of construction at the bottom of the ocean, with notices of the arrangements for securing telegraphic communication, electric light, and ventilation. Mr. Edison, who is one of the Commission of Engineers to which the project has been submitted, has given assurance that by means of an electric locomotive of his invention the distance of 5,600 kilometres may be traversed in fifty hours, and the colossal undertaking, inclusive of rolling stock, is not to cost

more than 2,000 millions of francs."

The *Gaceta* gives also a summary of a projected extension of the Moscow and Novogorod Railway by Orenburg and the river Ural to Orsh, the European terminus, and starting-point of the Asiatic line towards Tashkent-Kohlau, through desert regions requiring the construction of numerous bridges, cuttings, tunnels, and workshops of corresponding magnitude, the final terminus being Peking. It is spoken of as being beyond doubt one of the greatest undertakings of which human activity can conceive. Some readers may be heard saying, of both reports, And why not? But whether in a tone of confidence, or a tone of irony, may depend on circumstances of which I have no knowledge. JOHN C. BROWN.

MECHANICAL SHEAF-BINDERS.

THE trial of sheaf-binders at the exhibition of the Royal Agricultural Society, held in the beginning of last month at Derby, resulted in the GOLD MEDAL being awarded to the McCormick Harvesting Machine Company of Chicago. It is apparent in this case, like in many others, that the American manufacturers have not only had a much longer experience in the construction of sheaf-binding apparatuses, but likewise take the highest awards at our own exhibitions. Sheaf-binders are still almost comparative novelties with English makers, and we would like to see further trials made, with greater tests, between English and American manufacturers, to decide the real superiority of these machines, and the general adoption by our farmers of the better kind. It is satisfactory, however, to find that in almost every case improvements have been made by our own exhibitors since the last trials in 1878. It may be probably thought by some that all the operations involved in the binding of grain by machinery would necessitate very considerable care on the part of the driver, but in

one machine we noticed the work is done automatically, and required little attention. The driver, moreover, had the whole of the operations in view, and the sheaves were neatly formed of one size, whether the grain was upright or lodged and tangled.

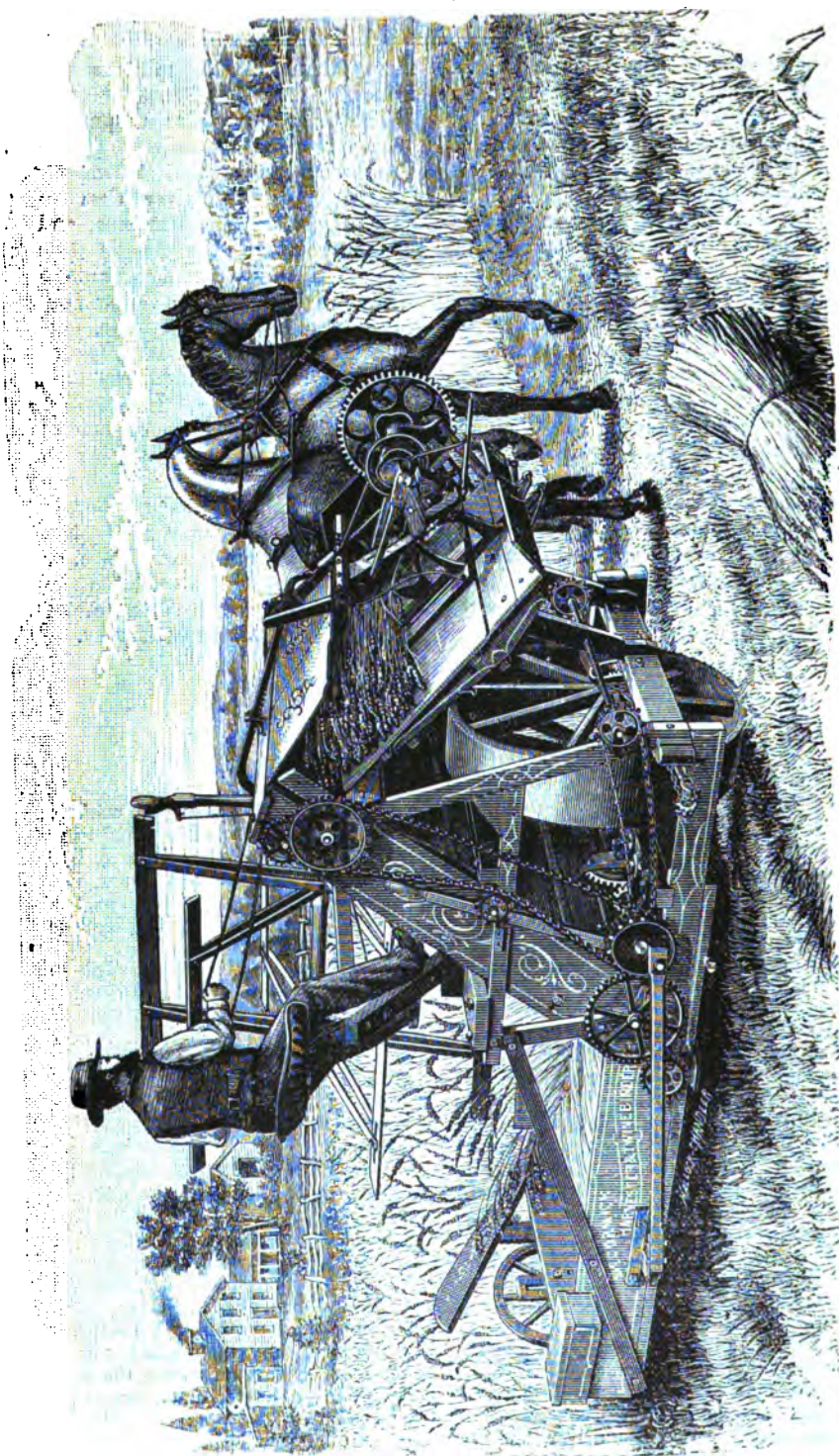
The Silver Medal was awarded to Messrs. Samuelson & Co., Britannia Works, Banbury, and the Johnston Harvesting Company, Chiswell Street, E.C.; and

Mr. H. J. King's machine (Newmarket) was highly commended for the principle of tying and separating sheaves.

The following brief description of the different prize machines is all that our space will allow:—

The McCormick Twine Sheaf-binder, given the highest award, is very similar to the McCormick wire binder, awarded the gold medal in 1878 at Bristol. The reel, knife, and platform, in construction are identically the same, but each have been improved to meet the present design—a lighter and more compact machine.

It will be seen by the illustration,

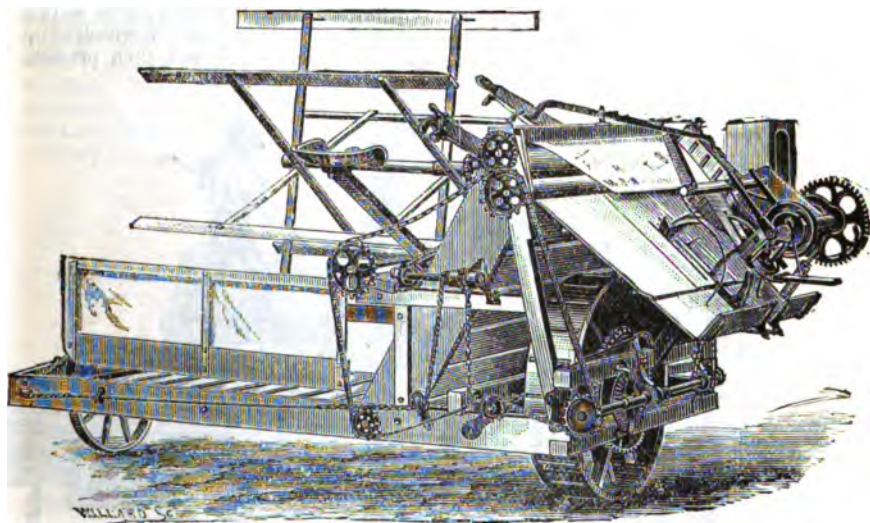


THE M'CORMICK HARVESTING MACHINE (GOLD MEDAL).

that the driving gear is almost all inside the main supporting wheel; this, in a measure, alters the angle of the elevator, but advantage has been taken to reduce the breadth of the machine on the binder side, without increasing it on the platform side. The twine binder has no traverse like the wire binder had, which increased the breadth of the platform, but the packing arms and needle arm work close up to the main wheel outside, permitting the height of the elevator to be reduced.

The Johnston Harvester Co.'s Automatic String Sheaf-binder is another improvement over those they exhibited in 1878-9-80 at Bristol, Kilburn, and Carlisle. The machines they exhibited

ing over the travelling wheel; these aprons bring the cut grain into contact with the binding apparatus, where it is received by two packing arms and compressed by them; when sufficient grain has been gathered to form a sheaf, a further compression takes place automatically, and the needle brings the string to the knotter, where it is tied, the string cut, and the sheaf automatically discharged, leaving the end of the string in the knotting apparatus ready for the next sheaf to be formed; the needle then recovers its former position, and the action of receiving, compressing, tying and discharging are repeated. The string binding apparatus has been substituted



THE JOHNSTON HARVESTER (SILVER MEDAL).

then were, however, wanting in strength and capacity to deal with the heavier crops of the trial fields in England, though successful in the lighter crops of America. The chief feature of the machine at Derby is the packing device and loop-knot tying apparatus, on the principle of Appleby's American patent. The driver can lower or raise the reel, and set it backward or forward as the crop requires. We are able to give a representation of this machine which will better illustrate its construction.

In Messrs. Samuelson & Co.'s String Binding Reaper, the grain as it is cut falls upon a moving canvas platform which conveys it to endless aprons pass-

ing over the travelling wheel; these aprons bring the cut grain into contact with the binding apparatus, where it is received by two packing arms and compressed by them; when sufficient grain has been gathered to form a sheaf, a further compression takes place automatically, and the needle brings the string to the knotter, where it is tied, the string cut, and the sheaf automatically discharged, leaving the end of the string in the knotting apparatus ready for the next sheaf to be formed; the needle then recovers its former position, and the action of receiving, compressing, tying and discharging are repeated. The string binding apparatus has been substituted

Mr. King's machine differs from the others in the needle having a direct up-and-down motion, the various movements in connection with binding and tying being derived from a revolving cam underneath the table.

The trials were commenced on the morning of August 8, on the grounds of Lord Harrington's farms at Thurlston. Of twenty competitors entered only eight or nine appeared, all of which were binders on the *high-level* system. The grounds were laid out in plots, one for each machine. All might be said to have done fairly well, as in some

cases, where the binders were put into a heavy crop of oats, not laid, but somewhat twisted, the test was a severe one, and accordingly watched with a keen interest. It was not generally supposed that McCormick's machine stood a chance of winning the first prize, and the

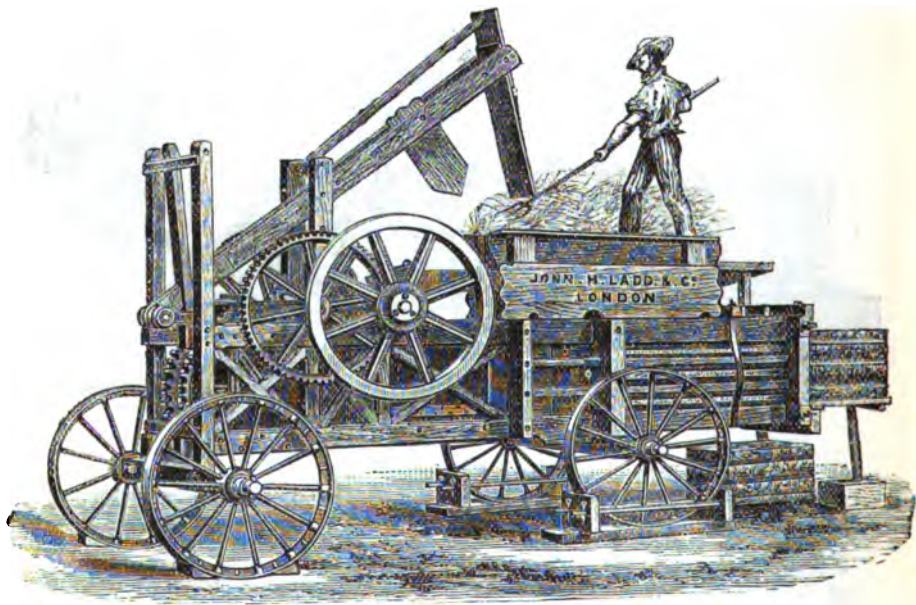
announcement of its success created no little surprise. Among the other exhibitors at the Derby show, we should mention Messrs. W. C. Wood, J. & F. Howard, Aultman & Co., &c, all of which stood good test trials.

A NEW HAY OR STRAW PRESS.

A SPECIAL silver medal was awarded to Messrs. J. H. Ladd & Co., of Queen Victoria Street, London, at the recent royal show at Derby, for a machine they have introduced from America, designed for compressing loose material of any description, and called the "Perpetual Press." The machine was exhibited at work, driven by steam,

and the following description explains the principle by which this press folds the hay into sections.

Fig. 1 illustrates the hopper filled with hay, which is pushed down at the centre, when the traverser is withdrawn, as shown in Fig. 3, and then pressed



THE "PERPETUAL" HAY OR STRAW PRESS.

ing hay, and attracted a good deal of attention. The regularity with which the operations of the machine are carried on and the leisurely movement of the attendants are apt to convey the idea that little work is being done, but the result shows otherwise. The operations being continuous, any quantity of hay can be baled without stopping, the bands being fixed whilst the machine is in motion. The accompanying illus-

tration will give the reader a very good idea of the construction of the machine, and the following description explains the principle by which this press folds the hay into sections.

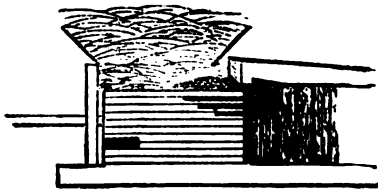


FIG. 1.

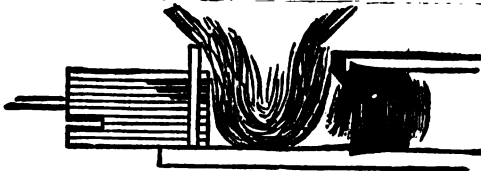


FIG. 3.

The hay overlapping the traverser, as shown in Fig. 1, is folded down by the spring top, as shown in Fig. 3, thus securing a smooth and even surface to the bale.

Fig. 2 illustrates a section removed from the bale, end view.

Light followers, with tying slots in them, are slipped in without stopping when the proper length of bale is formed, and through them the bale is tied while passing through the machine. The discharge end is adjustable, so that by turning a nut the bale is released, thus forming light or heavy bales as required.



FIG. 2.

The pressing is accomplished by a reciprocating traverser moving backwards and forwards underneath the hopper, pressing against the compact hay, and forcing beyond its traverse at each revolution all the hay pitched into the hopper. The chamber is provided with steel springs, which retain all the hay forced beyond it, and prevent its expanding back when the traverser is withdrawn.

Two men are required to operate the machine, one to pitch in the hay, and the other to tie up the bales. The bales can be formed to any length, and any kind of tie can be used.

The great advantages of this press over those in use hitherto are its perfect portability and continuous action, and we should think the many of our readers cultivating extensive estates in various parts of the country would find the "Perpetual Press" a valuable acquisition to their stock of agricultural implements.



POPLARS FOR ORNAMENT. — The Lombardy Poplar is called "a charming tree" in an illustrated leader in the *Garden*, and when seen in a small, detached group, with heavy, rounded tree masses near it, it deserves the words. It is only when out of place and proportion that it looks like a steeple misplaced. Its peculiar form and grand height render it very fit to plant as a contrast or break to long lines of masonry, whether in building façades, bridges or ramparts. The black Italian poplar is even a stronger tree, and nearly as erect and compact. Its wood is used for flooring and other inside work. Nothing excels it in the rapidity with which it builds up a defence capable of breaking, sifting and reducing the violent sweep of long, unobstructed winds. — *American Exchange*.

WIRE-WORM. — A French agriculturist states that neither his crops nor

trees ever suffer from wire-worm or May-bugs. He keeps an immense number of Houdan poultry that seek out and live on the insects. The fowls lay profusely and cost nothing to keep; they are bad hatchers, but an incubator remedies that defect.

A PREHISTORIC DIALOGUE ABOUT TREES. — "Say," said the ichthyosaurus to the pterodactyl, "when I was down among the pliocen people the other day I heard a new story." "Steam ahead," rejoined the pterodactyl, as he took his seat on the branch of a giant fern. "Well," continued the ichthyosaurus, "there was once a megatherium who had a number of fine Devonian pines in front of his yard, of which he was very proud, and he particularly cautioned young Megatherium, to whom he had given a little hatchet, not to cut them. One day, while walking in his garden, he noticed that one of the

trees had been cut." "Oh, cut that story, too," snarled the pterodactyl; "I heard that when I went to school with the primitive polyps." Then they separated, and the pterodactyl said he'd see him again when he had something new.—*Figaro*.

NON-FLOWERING OF LIMES.—In the park here lime trees, which are one of the special features, have this year, as regards flowering, completely failed us, and how to account for it I know not, except it is that their profuse flowering of the past three years, together with the long drought we have experienced this, has weakened their constitution to an unusual degree; but this, of course, is only a vague theory, and must be taken for what it is worth. Their not flowering, however, is to us rather a matter for regret than otherwise, not only on account of their fragrance, which for the time being literally perfumes the air, but also for the sake of the bees. To complete the honey harvest we have long since come to regard the flowering of the limes as a *sine qua non*. It would be interesting to learn how they have flowered in other localities, and, where they have failed, to what cause their failure is attributed.—J. HORSEFIELD, Heytesbury, *Gardener's Chronicle*.

LARGE WALNUT TREE.—At Whitehall, Shrewsbury, there is a magnificent walnut tree: the circumference at four feet from the ground is 15 ft. 7½ in.; the spread of the branches is over 40 yards. This tree probably dates from about 1550.—*Gardener's Chronicle*.

PINUS AUSTRIACA.—Dr. Seckendorff has published the first part of a monograph on this pine, which shows the exhaustive manner in which the Germans do their work. After some introductory observations and references to the literature of the subject, a special description is given of every part of the tree; then follows a section on the distribution of the tree throughout Austria and Hungary, descriptions of remarkable specimens, and statistics of the plantations in various parts of the empire. Twenty woodcuts and fifteen quarto tables illustrate Dr. Seckendorff's monograph.—*Gardener's Chronicle*.

APPLES IN HEDGES.—On the way from Maresfield to Uckfield in Sussex are to be seen at the present time some fine rows of apple trees laden with fruit, which to a good many people are a

novelty in their way, from the fact of the trees being planted in the hedges at a few yards apart. The trees are of course grown as natural standards, and the branches of the trees so profusely adorned with fruits of various sizes and colours are weighed down so that the tips of the branches touch the tops of the green hedges, which is an agreeable as well as an instructive sight to many who have never seen this method of apple-growing before. — *Gardener's Chronicle*.

THE ELM.—Prominence is given to the elm as an ornamental park tree at Hatfield. It deserves all that can be said in its favour, and it would be well if a little of the effusive admiration lavished on stunted foreign conifers and other novelties could be bestowed upon this and others of our native trees. In pleasure gardens big trees are often regarded as a kind of "accident" by some gardeners, including landscape gardeners—to be cut down and put out of the way if occasion requires it.—*The Farmer*.

THE PURPLE NUT.—Among the great variety of variegated and similar trees that are offered, our experience is that a great number are not of much use; but here and there there are exceptions, and remarkable ones, and this is one of them (of which we received good specimens from Messrs. Osborn, of Fulham), being an absolutely hardy tree, and in all ways well fitted for our climate. This may take an important place in plantations, though it should never be overdone. The judicious use of such a thing means its temperate use.—*Field*.

THE LOMBARDY POPLAR.—It may be interesting, though somewhat late, to supplement the letter of your correspondent, "Diss," at p. 764 of your last volume, by some observations made during a short tour in Belgium. In the lowlands about Antwerp and Brussels, which are somewhat south of London, the Lombardy poplars were much injured, and some were dead, but in the Ardennes, from 40 to 70 miles further south, it was a rare thing to find one alive. The valleys in this district vary from 500 to 800 feet above the sea. At Oxford the poplars are scarcely injured, while here, in Norfolk, hardly a healthy one is to be found, and nine out of ten seem to be quite dead.—J. M. D. P., *Gardener's Chronicle*.

THE JOURNAL OF FORESTRY & ESTATE MANAGEMENT.

SHERWOOD FOREST, AND SOME OF ITS MORE NOTABLE TREES.

BUT few of our old forests can compare in point of historical importance and legendary interest with "merrie Sherwode," whose picturesque features have for ages proved a prolific source of subjects for the pencils of artists of all classes to delineate, and formed a never-ending theme for innumerable prose writers and poets to dilate upon, while its various characteristics have tempted scientific men into long disquisitions, and found food for ballad-mongers of all periods.

Originally a royal forest, and one of the proudest of the proud possessions of the Crown, Sherwood, or Shirewood, was of vast extent, and second in importance for its timber and its deer to none in the kingdom, while various events and scenes enacted within its boundaries give it an historical interest that in some points raises it above most other localities. In dimension it at one time covered an area of some twenty-five miles one way by eight or ten the other, and embraced within its boundaries monasteries, townships, and knightly seats. At one of its extremities was Nottingham, where kings and princes stayed, "nobles did congregate," and sheriffs swayed despotic power; at another was Mansfield, "a favourite hunting-seat of the kings of Mercia," and where, later on, a royal palace was built and royal court held; and Worksop and a score other places of interest were included within or closely adjacent to its confines.

The name of Sherwood or Shirewood is, there can be no reasonable doubt, derived from the open-air assemblies, or folk-moots, or witenagemotes, of the shire being there held in primitive times, and this is well borne out by the fact of the village of "Shireoaks" taking its name from an enormous oak tree, the Shire Oak, under which the folk-moots were held, and which stood then, at the point of junction of the three counties of Derby, Nottingham, and York. Under the branches of this tree, it is said, shelter was found for 230 horsemen. It is curiously described in Evelyn's "Sylva."

The Nottinghamshire "moot" was held under a large oak in the forest, and very many instances are on record of similar trees being used for the moots of other counties. Thus the "Shire Oak" of Staffordshire stood by the side of the road from Lichfield to Walsall, about four and a half miles from the latter place; that of Lancashire on "Sherrocks (or Shire Oaks) Hill," and so on. Then, as recounted by Gomme, we have "Shrieves Wood" mentioned as one of the boundaries of Clarendon Forest, and a most important example, the "Shyreack," at Headingley, in Yorkshire, of which it is said, "medieval tradition declares this to have been the tree under which, in Saxon times, the shire meetings were held, and from which the name of Shireoak, or Shyrack, has been imposed upon the Wapentake," and "the Wapentake of Shireake seems to have received its name from some such a convention at some noted oak, or to use a local word, 'Kenspack-ake.'"

What these "moots" or shire meetings were it is not necessary to my present purpose to inquire into in detail, but it may be well to say that at these primitive open-air assemblies causes were heard and arranged, disputes as to ownership of lands, and what not, settled, crimes or acts of violence against the person adjudicated upon, and indeed all matters that required the voice of the freemen to be heard, arranged. There can be little doubt but that even in the earliest prehistoric times some of the stone circles which still remain to us might have been used for the purpose, as well as oak or other trees; and many records in later days attest the fact of the use of trees as meeting-places.

In the Celtic period the district in which Sherwood Forest is comprised formed a part of that division of our country that was occupied by the Coritani, and some few remains belonging to that period have, I believe, at one time or other, been exhumed within what were once its boundaries. During the Romano-British period there is abundant evidence of occupation, for Roman camps have been discovered in various parts of the forest, and other remains have been brought to light. Of some of these Hayman Rooke furnished an account to the *Archæologia*. Among these were one near Pleasley, 600 yards in length by 146 in breadth, of pretty regular form, with its ditches remaining; another, which he considered an exploratory camp, near the east end of his own village of Mansfield Woodhouse, on an eminence called Winney Hill; a third in Hexgrave Park; a fourth at a place called Combs, near the same neighbourhood, and others. Remains of Roman villas have also been exhumed. Beyond this, writes Mr. Stacey, "a Roman road appears to have crossed the forest, branching off from the great Foss Way, probably at the station named *Ad Pontem* in the Antonine Itinerary, which is supposed to have been situated at Farndon, near Newark.

It passed through or near Mansfield, where Roman coins have been found, and so by the camp near Pleasley Park to the neighbourhood of Chesterfield, when it would join the road from *Derventio*, or Little Chester, near Derby, to the north."

During Anglo-Saxon times the forest must have been not only well known, but much frequented, and many places within its boundaries bear undoubted Saxon names, and are, indeed, known to have belonged to King Edward the Confessor, and afterwards become the property of the Conqueror. Among these, according to Stacye, are "Mansfield, Edwinstowe, Warsop, Clune, Carburton, Clumber, Budby, Thoresby, and others;" and "it is worthy of observation," he continues, "as regarding the Saxon times, that the great battle in which Edwin, the first Saxon king of Northumbria, was slain, when fighting against Penda king of Mercia, and Cadwallader king of Wales, most probably took place, not as has generally been supposed, at Hatfield, near Doncaster, but at Hatfield in this neighbourhood, and that his body was buried at the village near this place, which from that circumstance derived its name of *Edwinstowe*, or, the place of Edwin." Although Sherwood, as a forest, is not directly named in Domesday Book, many places comprised within its district are described as portions of the king's great manor of Mansfield; and this circumstance of the Crown possessing already so much property here would greatly facilitate the operation of converting it into one of the great hunting-grounds of our Norman sovereigns, who were, most of them, passionately addicted to the chase. It would thus become a royal forest, and be brought under the cruel operation of the forest laws, which punished the least infraction of their injunctions with the severest penalties, even to the loss of life or limb. The earliest express notice of the Forest of Sherwood occurs in the fifth year of King Stephen, in which a William Peverel, of Nottingham, gave account of £23 6s. 8d. of the pleas of the forest; and, next, in the first year of King Henry II., when William Peverel the younger also answered respecting the plea of the forest. The elder William Peverel had charge of the castle of Nottingham, and held, in all, 162 manors. In Derbyshire he held twelve manors, and in Nottingham alone he had forty-eight merchants' and traders' houses, thirteen knights' houses, and eight bondsmen's cottages, besides ten acres of land granted to him by the king to make him an orchard, and the three churches of SS. Peter, Mary, and Nicholas, all three of which he gave, with their land, tythe, and appurtenances, by his charter, to the Priory of Lanton.

In the twelfth year of Henry II. Robert de Caux, or Caus, Lord of Laxton, a farmer under the Crown, answered for £20, and in the fifteenth year of the same reign Reginald de Laci for a like sum

(*pro censu forestæ*) under the then sheriff, Robert FitzRalph. In the "Foreste Booke conteyninge the Lawes, Statutes, and Ordinances of the Foreste of Sherwood in the countie of Nott," in the possession of Earl Manvers, is preserved a copy of a charter granted by John Earl of Mortain or Mortyn (afterwards King John) to Matilda de Caus and her husband, Ralph FitzStephen, confirming to them and her heirs the office of chief foresters in the counties of Nottingham and Derby, and of all the liberties and free customs which any of her ancestors had ever held. She died in 1233, and was buried at Brampton, near Chesterfield, where her monumental slab is preserved. It bears her half-figure within a quatrefoil, and the inscription, "*Hic jacet Matilda de Caus, orate pro anima ej' pat' nos'.*" She was succeeded in her office of chief forester by her son and heir, John de Birkin, and he, in turn, by his son and heir, Thomas de Birkin, who respectively did homage for this hereditary office, and their lands, in the eighth and eleventh years of King Henry III. A few years later, the office devolved on Robert de Everingham, in right of his wife Isabel, daughter of John de Birkin. With Everingham it remained till the time of Edward I., when it was seized by the Crown as forfeited, and since that time the guardianship of the forest has been conferred upon various persons of high station, as a special mark of royal favour.

In the sixteenth year of Henry III. a survey of Sherwood Forest was made by royal commission—

"by Hugh Nevil, justice of the forest, and Brian of the Isle, and others, and the parts that had been brought under the forest laws by previous kings, since the beginning of the reign of Henry II., were disafforested, or set free from those stringent enactments [of the *Charta de Foresta*]; and the bounds and limits of the forest, still preserved as such, were clearly defined. These were stated to be thus fixed; 'to be firm, and stable, and abide for ever.' Starting from a place called Conyngswath, i.e., the King's Ford, the line was drawn by the highway that goeth towards Welhaugh unto the towne of Welhawe towards Nottingham, so that the close of the towne of Welhawe is out of the forest, from thence by the side way that goeth betwixt Welhawe and Nottingham unto Blackstone Haugh, and from thence unto that place where Doverbeck river goeth over the side way, and so following the Doverbeck to where it enters the Trent. Again, starting westward from Conyngswath by the river Maiden, the boundary follows the river to Warsop, and from thence by the same stream to Plesley Haye, and from thence to Otterbridge, and from thence turning by the great highway which leads to Nottingham unto Milford Bridge, from thence unto Maidenhead, and from thence betwixt the field of Hardwick and Kirkby to a corner called Nuncar, and from thence by the assart of Iwan Britan unto the Earl's Steigh, and from thence unto Stolgate, and from thence by the great highway under the old castle of Annesley, and from the same castle unto the towne of Lindby, passing through the midst of the towne to the mill of the same place, situated on the river Leen, and so following that stream to Lenton, and so to the Trent, where the Leen entered by its old course, and so along the river Trent to the fall of Dover-

beck, saving Welthaw Hagh, and other the king's demesne woods in the countie of Nottingham."—*Thoresby MS.*

Another survey of Sherwood Forest was made in 1300, when the above-named bounds were, under certain stipulations, confirmed. In the "Forest Book" in which this is recorded the following note, which I quote from Mr. Stacey, is appended :—

"And yt is to understand that the foresaid walks, by the afore-named walkers, that there are put out of the forest, the wood of Roomwood, the towne of Carburton, with the field of the same; Owthesland, the townshippes of Clumber, Scofton, Reniton, half of the townshippes of Buddby, with the north fields of the same; the townshippes of Thoresbie, and all the towne of Skegbie, with the fields of the same, except a little pcell of the field of the same towards the east; all the towne of Sutton-in-Ashfield, with the fields of the same; and the hamblets adjoininge the townshippes of Bulwell, with the wood adjoininge that is called Bulwell Rise, and the King's Hay of Wellay. *Item*, the wood of the Archbishop of York, that is called Little Hagh, was disafforested by John of Lithgrows, and afterwards all the townshippes aforesaid, with hedges and woods adjoininge, were put again into the forest by the aforesaid King Edward, son of King Henry III."

The places which were thus again put into the forest were parts of the old demesnes of the Crown, even as far back as the time of Edward the Confessor.

From an Inquisition of the 35th of Henry III. it appears that there were within the forest three keepings, viz., the first between Leen and Doverbeck, the second being the High Forest, and the third Rumewood; and that Robert Everingham, as chief keeper, ought to have a chief servant sworn, going through all the forest at his own costs, to attach trespassers and present them at the attachments before the verderers. In the first keeping he must have one forester riding, with a page and two foresters on foot, and there were to be also two verderers and two agisters; in this keeping were three hays, or parks, viz., Beskwood Hay, Lindby Hay, and Welley Hay. In the second keeping, or the High Forest, Robert ought to have two foresters riding, with their two pages, and two foresters on foot without pages; and there were to be also two verderers and two agisters; in this keeping there were two hays, viz., Birkland and Billahaugh, and also the park of Clipston, and in these hays and parks two verderers and two agisters. In the third keeping, Rumewood, Robert ought to have one forester on foot, and there were to be two woodwards, one for Carburton and another for Buddby, also two verderers and two agisters. He ought also to have a page bearing his bow through the forest, to gather chiminage. By the same document it is made clear that the hays of Lindby, Birkland, and Billahaugh, and the park of Clipston, were often under the immediate keeping of the king's Justices in Eyre beyond Trent, and that they ought to have one forester riding alone through all the forest. Also

that the abbot and monks of Rufford, from the time of Henry II., who granted them the privilege, had liberty to take vert in their wood, within the reward of Sherwood, and "whatsoever was to them needful for their owne use, and to all their house boote and hay boote, as well as to all their granges in the forest and without; and they might have a forester of their owne to keep their said wood," who was to do fealty before the justices of the king, and to report at the attachments of the foresters and verderers of the Crown what trees were taken by the said monks.



SCENE IN SHERWOOD FOREST.

The officers of the forest in later times seem to have been a "Lord Warden, Steward, and Keeper of the Forest of Sherwood," appointed by letters patent from the Crown; a Bow-bearer and Ranger; four Verderers; a Clerk of the Forest; a Steward appointed by the Lord Chief Justice in Eyre; a Clerk of the Swainmote and Attachment Courts; a Beadle; nine Keepers appointed by verderers, one for each of the nine walks into which the forest was then divided (*viz.*, Newstead and Popplewick; Langton Arbour, Blidworth, and Highwells; Kirkby, Sutton, and Annesley Hills; Mansfield and Lyndhurst; Mansfield Woodhouse and Noman's Woods; Birkland, Bilhaugh, and Clipston Skroggs; Roomwood and Osland; Blidworth and Farnsfield; and Calverton and Arnold Hill); a Woodward for Sutton, and another for Carlton; and others."

Inroads by grants, enclosures, and the like, upon the old forest lands, and the constant cutting down of trees for naval, household, building, and carpentering purposes, have, in later times, taken away the glory of old Sherwood, and reduced its confines to very narrow limits. Still there are at Welbeck, Birkland, Clumber, Thoresby, and other places, many acres of unalloyed beauty, and hundreds of trees of surpassing interest and grandeur. To some of the more historically famous of these "giants of the forest" I shall proceed to direct special attention, but before doing so must digress a little from the historical and descriptive, to the legendary, phases of "Merry Sherwood."

One of the great charms of Sherwood Forest, one that has made its name a household word in the mouths of all people, and around that name has cast a halo of undying interest, is its intimate association with the great ballad-hero, Robin Hood, of whose exploits it was the scene, and under whose still-existing trees many of his "mad pranks" and deeds of daring were played. Who can forget the grand old "Lytell Geste" of Robin Hood? Who the "New Ballad of Robyn Hood, showing his Birth, Breeding, Valour, and Marriage at Titbury Bull Running"? Who the "True Tale," and the "Garlands," and the "Merrie Dytties," recounting his doings in Sherwood? And who but must feel that that forest, grand though it be in its examples of arboriculture and its scenery, derives half its interest from its association with the outlaw and his brave companions?

That Robin Hood was as veritable a personage as Sherwood was a forest, not a shadow of doubt rests in my own mind, nor in the minds of others who have devoted time to searching into the matter, and investigating all the bearings of the "Robin Hood lore," and the "folk song" (as I may venture to call it) that is, happily, so abundantly spared to us. Some of the ballads are of a general nature, others relate to his prowess in the field, others to his success in the chase, and others again to the well-planned and successfully carried out robberies committed by himself and "his merry, merry men" on kings, prelates, and knights; while others recount deeds of charity and of much-needed help given ungrudgingly, unsought for, and effectually, to oppressed against oppressor, and to the weak against the cruel and strong.

For the purpose of showing—though very briefly—the intimate connection of Sherwood Forest with the redoubtable outlaw, I here quote portions of one or two of the ballads to which I have alluded, and also introduce for the reader's amusement and delectation three or four of the quaint old cuts which "adorn" them, and which have been looked upon with admiring and wondering eyes by our forefathers and foremothers a century or two back. In the course of one of these we read:—

"Come hither, Little John," said Robin Hood,
"Come hither, my page, unto me ;
Go fetch me my bow, my longest long bow,
And broad arrows, one, two and three ;
For when it's fair weather we'll into Sherwood,
Some merry pastime for to see."

When Robin Hood came into merry Sherwood,
He winded his bugle so clear,
And twice five-and-twenty good yeomen and bold
Before Robin Hood did appear.
"Where are your companions all ?" said Robin Hood ;
"For still I want forty and three."

Then said a bold yeoman, "Lo, yonder they stand,
All under a greenwood tree ;"
As that word was spoke, Clorinda came by,
The queen of the shepherds was she,
And her gown was velvet as green as the grass,
And her buskin did reach to her knee.

Her gait it was graceful, her body was straight,
And her countenance free from pride,
A bow in her hand, and a quiver and arrows
Hung dangling by her sweet side.
Her eyebrows were black, ay, and so was her hair,
And her chin was as smooth as glass ;
Her visage spoke wisdom, and modesty too,
Sets with Robin Hood such a lass.

Said Robin Hood, "Lady fair, whither away,
Oh, whither, fair lady, away ?"
And she made him answer, "To kill a fat buck,
For to-morrow is *Tilbury Day*."

Said Robin Hood, "Lady fair, wander with me
A little to yonder green bower ;
There sit down to rest you, and you shall be sure
Of a brace or a lease in an hour."

And as we were going towards the green bower,
Two hundred good bucks we espied ;
She chose out the fattest that was in the herd,
And she shot him through side and side.
"By the faith of my body," said bold Robin Hood,
"I never saw woman like thee ;
And com'st thou from east, ay, or com'st thou from west,
Thou need'st not beg venison of me.

However, along to my bower you shall go,
And taste of a forester's meat,"
And when we come thither we found as good cheer
As any man needs for to eat ;
For there was hot venison, and warden pies cold,
Cream clouted, with honeycombs plenty ;
And the servitors they were, beside Little John,
Good yeomen at least four-and-twenty.

Clorinda said, "Tell me your name, gentle sir,"
And he said, "'Tis bold Robin Hood ;
'Squire Ganwell's mine uncle, but all my delight
Is to dwell in the merry *Sherwood* :
For 'tis a fine life, and 'tis void of all strife."
"So 'tis, sir," Clorinda replied :
"But oh," said bold Robin, "how sweet would it be
If Clorinda would be my bride !"

She blushed at the notion ; yet, after a pause,
Said, "Yes, sir, and with all my heart."
"Then let's send for a priest," said bold Robin Hood,
"And be merry before we do part."
But she said, "It may not be so, gentle sir ;
For I must be at Titbury feast :
And if Robin Hood will go thither with me,
I'll make him the most welcome guest."

The result being that they went to Tutbury, had strange adventures by the way, met the minstrels' procession with the Bull and the Morris dancers, and singers singing "Arthur a Bradley" (a ballad whose hero probably takes his origin from Bradley in the same neighbourhood), had a jolly dinner, and then—

When dinner was ended, Sir Roger the parson
Of Dubbridge was sent for in haste ;
He brought his mass-book, and he bid them take hands,
And he joined them in marriage full fast.
And then as bold Robin Hood and his sweet bride
Went hand in hand to the green bower,
The birds sung with pleasure in merry *Sherwood*,
And 'twas a most joyful hour.

And when Robin came in sight of the bower,
"Where are my yeomen ?" said he,
And Little John answered, "Lo, yonder they stand,
All under the greenwood tree."
Then a garland they brought her, by two and by two,
And plac'd them at the bride's bed ;
The music struck up, and we all fell to dance,

and other merry doings, and the ballad writer concludes his lucubrations by saying:—

And then I'll make ballads in Robin Hood's bower,
And sing 'em in merry *Sherwood*.

In another famous ballad, that of Robin Hood and the Nottingham Tanner, Arthur a Bland, it is said :—

As he went forth, in a summer's morning,
Into the forest of merry *Sherwood*,
To view the red deer that range here and there,
There met he with bold Robin Hood.

* * * * *

"I am a keeper in this forest,
 The king puts me in trust
 To look to his deer that range here and there,
 Therefore stay thee I must.

* * * * *

"In the forest of merry *Sherwood*
 Hereafter thou shalt be free."

* * * * *

Then Robin Hood took them both by the hand,
 And danc'd round about the oak tree ;

"For three merry men, and three merry men,
 And three merry men we be ;

And ever after, as long as we live,
 We three will be as one :

The wood shall ring, and the old wife sing,
 Of Robin Hood, Arthur, and John."

Innumerable quotations, each referring to Sherwood Forest and its



association with Robin Hood, might be made from other ballads and "garlands," but it is not necessary for my present purpose to do so.

The woodcuts I have selected are carefully copied from the rare originals in the Roxburghe collection in the British Museum, and are not only excellent examples of the designs that usually "adorn" the black-letter ballads of the period, but are quaint representations of costume and of stirring incidents in the career of the outlaw and his band. The first is Robin Hood, the "bowman bold," as he appears on the broad-sheet of the first of the ballads I have just quoted, and the next is the cut belonging to two black-letter ballads, the one entitled, "Robin Hood newly reviv'd ; or, Robin Hood and the Stranger ;" and the other, "Robin Hood, Will Scadlock, and

Little John; or, a Narrative of their Victory obtained against the Prince of Aragon and the two Giants; and how Will Scadlock married the Princess." The figures are undoubtedly intended to represent Robin Hood in the centre, supported by his two henchmen, Little John on the one side, and Will Scarlet (or Scadlock), his nephew, on the other. It begins:—

Now Robin Hood, Will Scadlock, and Little John
Are walking over the plain,
With a good fat buck, which Will Scadlock
With his strong bow had slain.



The next two illustrate the droll story of "Robin Hood and the Bishop," whom he robbed, and compelled to sing mass. They are scenes in the "Forest of Merrie Sherwood," the first representing Robin Hood changing clothes with an old woman that he might deceive and entrap the bishop, and the next shows the prelate after capture.

Then Robin took hold of the Bishop's horse,
And ty'd him fast to a tree;
The Little John smil'd his master upon,
For joy of this company.

Robin Hood took his mantle from's back,
And spread it upon the ground,
And out of the Bishop's portmantle he
Soon took five hundred pound.

"Now let him goe," said Robin Hood,
Said Little John, "That may not be ;
For I vow and protest he shall sing a mass
Before that he go from me."

Then Robin Hood took the Bishop by th' hand,
And bound him fast to a tree,
And made him sing a mass, God wot,
To him and his yeomandry.



And then they brought him through merry Sherwood,
And set him on's dapple grey,
And gave him the tail within his hand,
And bad him for Robin Hood pray.

And now, in the first place, I proceed to speak of one portion of the district composed in the ancient forest of Sherwood—Welbeck and its glorious surroundings—and shall reserve other portions, as

well as Clumber, Thoresby, Birkland, and their interesting features for succeeding papers.

Welbeck Abbey, the seat of his Grace the Duke of Portland, with its broad domains, occupies an area of vast extent, and comprises within its boundaries a magnificent and perfectly unique mansion, with stables and riding schools, dairies and workshops, offices, lodges, and residences, of more than regal extent; parks that are rich in their grand succession of lovely views and of patriarchal forest trees, and herds of deer that are of unsurpassable character—for it has its fine



WELBECK FROM THE SOUTH-EAST.

and noble herd of white deer, its herd of fallow deer, and its separate herds of red and other deer, and each of these is of great extent and of fine and noble quality. Before the Conquest, Welbeck was held by the Saxon Sweyn, but afterwards it passed to the Flemangs as part of the manor of Cuckney. By Thomas de Cuckney (grandson of Jocus de Flemang) the abbey was founded, and here, in the reign of Henry II., he planted a settlement of Præmonstratensian or White Canons from Newhouse, in Lincolnshire, the first house in which they were established in England. The abbey was dedicated to St. James, and endowed with grants of land. These were from time to time considerably augmented, and in 1329 "the Bishop of Ely bought the

whole of the manor of Cuckney and settled it upon the abbey on condition of their finding eight canons who should enjoy the good things, and pray for Edward III., and his queen, their children and ancestors, &c.; also for the bishop's father and mother, brother, &c.; but especially for the health of the said Lord Bishop whilst he lived, and after his death for his soul, and for all theirs that had faithfully served him or done him any good," to which was added this extraordinary injunction, "that they should observe his anniversary,



WELBECK, WEST FRONT AND OXFORD WING.

and on their days of commemorating the dead should absolve his soul by name;" a process whose frequent repetition might naturally be considered as needless, unless the pious bishop supposed that he might perhaps commit a few additional sins whilst in purgatory.

In 1512, it is stated, the abbey at Welbeck was made the head of the order. At the dissolution it was granted to Richard Whalley, and later on, after other changes, passed to Sir Charles Cavendish. By him the abbey was converted into a noble mansion, but little of the original religious house being left standing, and those parts only used as cellars, or here and there a wall for the new building. The

present mansion is said to have been commenced in 1604, and was afterwards much altered and enlarged; the "Riding House" (now the picture gallery) being built in 1623, and the stables two years afterwards, from the designs of John Smithson. It was much altered by its various owners, but the main changes took place under the late (fifth) Duke of Portland, who gave it a character peculiarly its own. Unlike other mansions, Welbeck cannot be all seen on the surface, for many of its noblest and grandest features, and much of the finest and most complicated examples of constructive skill, are hidden away from the general observer, and only flash upon him as brilliant creations of genius when he is permitted to approach them by descending into the "bowels of the earth." Then, and then only, does the magnificent design of the noble owner become apparent, and then only does the vastness of the work become manifest.

It is not necessary here to describe the mansion of Welbeck or its remarkable architectural and engineering peculiarities, nor to speak of the miles of underground passages and roadways that have been constructed around and within it. Those who wish for particulars on these and other points, or on the family history of its noble owners and the descent of the property, will find all they can wish for in my "Stately Homes of England" (second series), where a lengthily illustrated account of the place appears, and from which some of the engravings here introduced are taken.

LLEWELLYNN JEWITT, F.S.A.

(To be continued.)

REMARKABLE SILVER FIR.

ANY tree that has attained a height of 144 ft. in Britain, may, I think, be fairly entitled to be considered remarkable. Such was the height of a silver fir cut down on Saturday, September 17th. It was the highest tree in Longleat Park (probably the loftiest tree in Britain), and formed one of a group of nine silver firs, standing on rather an elevated level piece of ground. The site is fully exposed on the north-east side. Its dead withered top has been conspicuous in the group for several years, and it was evident from the appearance of the tree that it was gradually dying from the top downwards; doubtless, however, the severity of last winter hastened its death. The belt is quite sound for about 60 ft. up, where it divides into two heads. Although it was the highest tree in the group, it was by no means the finest and bulkiest specimen, as it only girthed 10 ft. 10 in. at five feet above the ground, and contained about 350 ft. of timber; whereas the largest tree measures 15 ft. 3 in. at five feet up, and contains between 400 ft. and 500 ft. of timber; its height is 138 ft., and it is still in full healthy vigour. The age of the group I should guess to be nearly 200 years old.—GEORGE BERRY, *Longleat*.

TREE PRUNING.

*Translated from the French of A. des Cars, by Charles S. Sargent,
Professor of Arboriculture in Harvard College, U.S.*

THE appearance of many trees, their trunks covered with gaping wounds, protuberances, and the stumps of dead branches, clearly indicates that they have received careless or ignorant treatment. It is evident even to persons little familiar with the art of Sylviculture that such trees are decayed to the heart, and of little value for industrial purposes. The number of trees thus affected is very great, and the annual aggregate loss to the community from the bad management to which trees are everywhere subjected is enormous. Such a condition is the result generally of entire neglect of pruning, or often, perhaps, of an unnatural and therefore improper system.

The idea of increasing the productive capacity of forests by systematic pruning is not a new one,—no process of Sylviculture has been more often discussed. In Belgium, where more than in any other country the subject of forest management has occupied the public mind, the two legislative chambers, a few years ago, discussed this subject at great length, without reaching any satisfactory conclusion; in France, authorities do not yet agree,—some condemn all pruning, while others believe in the advantage of pruning, but without agreeing on the best methods to adopt.

Certain theorists declare that there is an absolute correlation between the roots and the branches of a tree, and that the cutting off of a branch necessarily kills the corresponding root. If such a theory is correct, how can the results obtained by cutting back young trees to the ground or the topping of pollards, by which all branches are suppressed, be explained?

A more serious objection to pruning, which is often made by timber dealers—the persons, perhaps, most interested in the matter, and therefore most competent to judge—is that trees which have been pruned lose by the operation twenty-five, thirty, or even fifty per cent. of their value, that is, a quarter to a half, and that such trees are generally decayed. This cannot be denied; but it proves that such trees have been badly pruned, not that all pruning is bad. Opponents of pruning maintain too that the scars which such operations must leave on the trunks of trees indicate internal defects in the wood, and that these trees cannot be readily sold. This objection is also well founded in view of the manner in which the operations of pruning are generally performed; but it is the method which is faulty, and such objections must disappear before more scientific and rational treatment.

A glance at Fig. 1 shows the effects of bad pruning. Here the trunk of a beech is represented mutilated, and in a condition which might well justify the general condemnation of pruning, if pruning were always followed by such results.

A system of forest management which discards pruning is disastrous, and, even if it were less so, would have many practical objections. A tree left entirely to itself generally develops in one of two directions. It does not grow upwards, and assumes the low round form common to the apple tree; the lower branches grow disproportionately large and absorb too much sap, to the detriment of the top of the tree; and these long, heavy branches are often broken by the wind or by snow and ice, leaving hideous stumps (Fig. 2). Trees of this form are very common; they generally decay at the top before reaching maturity, and have little commercial value. On the other hand, many vigorous trees grow disproportionately at the top; the lower branches die from insufficient nourishment, fall off, and leave, when large, bare, decayed spots, which gradually penetrate to the heart of the tree, and ruin also its commercial value (Fig. 3).



Fig. 1. — Badly pruned Beech; its trunk covered with cavities of different depths and partly filled with water.

Wounds caused by the breaking off of large branches by wind or snow produce the same results (Fig. 4). There is no remedy for the

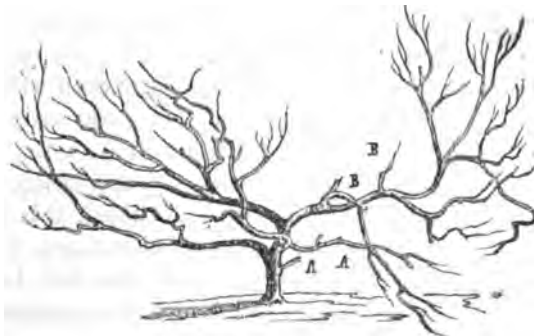


Fig. 2.—A young unpruned Oak growing in rich soil. AA, Dead branches. BB, Branches broken by the wind or by the weight of snow and ice.

dangerous effects of such accidents except in pruning; it is a simple question of surgery. Without pruning the tree must sooner or later decay; with pruning, its value may be preserved.

The secret of obtaining a complete cure in all operations requiring the removal of a branch, either living or dead, consists in *cutting close to, and perfectly even with, the trunk*. Many authorities have hinted at this, the cardinal principle of all pruning; but M. de Courval first clearly demonstrated its importance, while his discovery of the value of coal-tar or the refuse from gas-works as a covering for wounds made in pruning renders the application of his rule in all cases entirely safe.



Fig. 3.—Portion of the trunk of an unpruned Oak ruined by the decay of its lower branches.

thus elaborated by the leaves is carried down again in a liquid state, and is deposited, year after year, in the successive concentric layers of wood which form the trunks of all trees, with the exception of palms, yuccas, &c., which need not now be considered.



Fig. 4. — Unpruned Oak, decaying after the loss of a large branch broken by the wind.

Formation of Wood.—The reason that a branch should be cut close and even with the trunk is found in one of the simple laws of plant life. It is known that sap has a double movement—that it mounts from the roots to the leaves, and returns again in an elaborated condition to the roots. Roots take up water from the soil in which there are various salts in solution. This water rises to the leaves; these absorb from the air and decompose carbonic acid gas, the basis of which is carbon, which combined with water constitutes the elements of wood. The sap thus elaborated by the leaves is carried down again in a liquid state, and is deposited, year after year, in the successive concentric layers of wood which form the trunks of all trees, with the exception of palms, yuccas, &c., which need not now be considered.

It follows that a wound caused by the amputation of a branch must, in order to heal properly, be made perfectly even with the trunk, that every part of its outer edge may be brought into direct communication with the leaves through the network of cells destined to convey the descending sap. Although this theory rests on one of the most elementary principles of vegetable physiology, it has not been applied before to practical forest management. The amputation having been made even with the trunk in the manner explained, new wood will soon appear, forming first round the top and sides of the wound, which is soon completely surrounded by the new growth; the wound is gradually healed over, and the decay of the trunk prevented.

The time required for the complete healing of a wound depends, of course, upon its dimensions and the natural vigour of the tree.

The principle being established that large wounds can be made without injury to the tree if care is taken in the manner indicated to prevent decay, it is easy to show the advantage of cutting off injured branches of any size. It is preferable to avoid, of course, the necessity of making large wounds by properly pruning trees when young. All foresters agree that trees should be trained when young, but De Courval has amply demonstrated by numerous remarkable specimens exhibited at the Agricultural Show of Paris, in 1861, and at the Universal Exposition of London, in 1862, that it is beneficial, and often indispensable, to prune the oldest trees if care and judgment are used in the operation. He has clearly shown, too, that trunks so treated attained a larger size and a greater value in a given time than those which, under similar conditions of growth, had been allowed to retain all their badly placed branches. I regret in this connection to differ from so eminent an authority as De Breuil, who gives the following rule: "Amputations must be performed in such a manner that the diameter of the wound shall not exceed that of the end of the branch." Such a practice must, I believe, be disastrous, for whenever a branch of large size is amputated in this way, it is evident that a cavity in the trunk of the tree will sooner or later appear.

Disadvantages of the Common System of Pruning.

—As descending sap alone forms the new bark and wood which heal over a wound, it follows that if a cut is made in the manner represented by the line A B (Fig. 5), the new growth cannot cover over the lower part, B C, which is cut off from communication with the leaves; so that the wood included in the lines A B, A C, not being covered with a new growth must soon begin to decay, and in time destroy the trunk of the tree (Fig. 6). Examples of this bad method are very common. Each amputation of a branch produces a cavity, and the tree soon becomes entirely decayed. In view of such destruction, it might seem, perhaps, that branches of a certain diameter cannot be safely amputated. That this is an erroneous idea will be easily seen; and it is only necessary to make the amputation even with the trunk



Fig. 5.



Fig. 6.—Decaying oak, showing the effect of amputating a branch in such a way that the diameter of the wound does not exceed the diameter of the base of the branch.

and then cover the wound with coal-tar, to avoid all bad results. Although wounds caused by the amputation of small branches heal over in spite of the faulty methods of pruning generally employed, such operations are, nevertheless, attended with considerable danger to the tree. Protuberances are formed on the trunk at the points

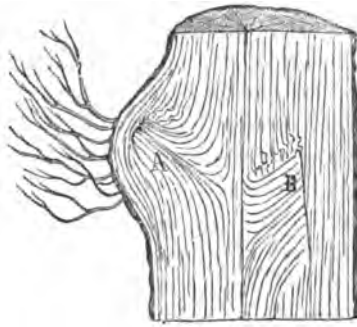


Fig. 7.—Longitudinal section of the trunk of an oak cut twenty years after pruning. A, a medium-sized branch badly amputated. B, a large branch properly amputated.

where the branches have been cut, and these produce a multitude of small weak shoots (A, Fig. 7). The development of such shoots indicates that a tree is in an unnatural condition, which may be entirely avoided by cutting the branch even with the trunk (B, Fig. 7).

Experience and common sense show the objection to leaving any portion of an amputated limb, but there is greater danger in allowing stumps one or two feet long to remain on the trunk, a common practice even among persons interested in the preservation of trees (Fig. 8).



Fig. 8.—Stump of a branch left in pruning.

These stumps, deprived of communication with the leaves, die, the bark falls off, while the stumps themselves remain like plugs of decaying wood driven into the trunk (Fig. 9).

In a few years the stumps rot (Fig. 10), and decay penetrates to the heart of the tree. Fig. 11 shows the fatal results of this method of pruning.

The method of pruning deciduous forest trees, and especially the oak, will be first considered in this treatise. The oak is selected as the most valuable of our timber trees, and because unfortunate and deeply rooted prejudices exist in regard to the manner in which it

should be pruned. Particular attention will be given to the treatment of trees intended to grow on to maturity, in connection with a system of coppice growth, because this system of forest management is now very generally adopted.* The methods here advocated are, however, equally applicable to other systems of silviculture; and they should interest small as well as large landowners, as in every field and along every roadside are trees to prune and improve. If the importance of properly caring for trees could be appreciated, an important addition to the wealth of the nation might easily be made. Oaks, stunted or abandoned, and only fit for fuel, might in a few years be transformed into trees of great value; and, if all who prune may not themselves find their reward, they can at least have the satisfaction of doing something to benefit another generation.



Fig. 9.—Condition of the stump at the end of the fifth year.

Advantage of increasing the Number of Reserve Trees.—In addition to the advantages which each individual tree may derive from the method of pruning recommended in this treatise, there is a possibility of adding, and, in fact, doubling the number of reserve trees in a plantation without interfering with the coppice or growing sprouts which surround them.



Fig. 10.—Condition of the stump at the end of the tenth year.

If it can be proved that the number of timber trees may be doubled in a plantation by good management, and that the value of individual trees scattered through the fields and along the roadsides may be wonderfully increased, it is easy to understand that a landowner may greatly benefit himself and add to the wealth of his country by adopting such methods.

That pruning can accomplish the results which are claimed for it is found in the fact that trees treated by the rational system

* *Futaie sur taillis*, a term which is without equivalent in the English language, is applied in France to a very common system of forest management. It consists in allowing a certain number of selected trees in a plantation to grow to maturity, while the remainder is treated as coppice, or "sprout land," and cut over at stated periods, varying from ten to fifty years, according to the nature of the soil or the necessity or wishes of the proprietor. The trees left to reach maturity are called "reserves," and are intended to furnish large timber for purposes of construction. These, of course, receive the greatest care and most careful pruning.—C. S. S.

proposed grow more vigorously and retain their foliage longer than unpruned trees in the same locality, grown under similar conditions.



Fig. 11.—Trunk of an oak ruined by the decay of the stump of a branch.

Authorities agree on the influence which trees exert on the climate, the watercourses, and the fertility of the soil. Economically indispensable, trees are not less important in their influence on the health of man. Trees purify the air we breathe by absorbing noxious gases, and it is clearly for the interest of the community to preserve and multiply the forests, which protect the human race from many evils,

(To be continued.)

THE SILVER FIR (*Picea pectinata*).

ON a former occasion I brought this noble but neglected tree under the notice of the readers of the *Journal of Forestry*, as a tree which ought to be extensively planted on suitable soils in our home plantations. Every lover of trees, I have no doubt, will admit that the common silver fir is a noble ornamental tree; but few arboricultural writers hitherto have recommended it as a remunerative plantation tree. No doubt in its infant state it is a tender plant, but when the tree is fairly established in a suitable soil it makes rapid advances, so much so that it is rarely surpassed by any other coniferous tree, the *Abies Douglasii* excepted.

Upon the Earl of Mansfield's estate of Logiealmond, at upwards of 1,000 ft. above sea-level, at the base of the Grampian Hills, in a large fir plantation forty years of age, the silver firs are growing luxuriantly, and are much larger in size than either larch or Scots fir in the same plantation.

Upon the estate of Lynedoch there are several magnificent specimens of this tree of large dimensions; the largest one was measured in 1878, when the height of its beautiful straight bole was 110 ft., girth 13 ft. 10 in. three feet from the ground, and it contained 425 cubic ft. of timber in the bole alone.

One commendable feature in its character is that on soils where larch and spruce are deteriorated with dry rot the silver fir is rarely affected with rot. It is seldom indeed that the silver fir is planted in large masses alone, but when closely planted it can be reared up as straight and clean in the stem as either larch or spruce, and for producing shelter in belts no other tree will equal it. Twenty-one years ago I was employed to lay down belts of plantations for

shelter upon a small estate of arable land near Perth, in a very exposed situation. The belts were laid down only an imperial chain in breadth, and were enclosed with young hedges, composed of thorn and beech; the ground was planted with silver fir and larch in equal numbers at 4 ft. apart. The estate shortly thereafter was sold, at which time my connection with the property ceased. Recently I paid a visit to the property on purpose to see the condition of these belts, which I found so far satisfactory. The hedges are strong and exceedingly healthy, but are considerably neglected. The larch trees at an early stage of their growth made a very rapid start, and acquired the mastery over the silver fir plants, and, as there is no resident forester kept on the property, the larches were permitted to predominate for years in a crowded state, and in consequence many of the silver firs were retarded and stunted in their growth; but notwithstanding there are many of them very promising trees. The larches now are all naked poles, whereas the silvers are well furnished with green branches down to the surface of the ground, and together with the hedges are producing substantial shelter to the fields around.

The silver firs were originally planted with the view of being reared up as the ultimate crop for shelter. I saw one of the farmers on the property, who told me that were it not for the silver fir the shelter from the larch would be now comparatively worthless.

Silver fir may be planted successfully on the following soils:—on deep rich loam, on dry sandy soil, good moorland if well drained, &c.; but on humid land the plants suffer much from late spring frosts, and even up to a middle stage of growth their stems are frequently injuriously infested with the silver fir bug.

Throughout the most part of the wooded counties of Scotland, where silver fir is found upwards of forty years of age, the trees generally surpass in size any other kind of conifers. The value of its timber is not so generally well known, or appreciated as it deserves. I have tested its durability in many ways, and I prize its timber for many purposes next to larch.

On 17th April, 1877, when men were engaged lifting old railway sleepers near Luncarty Station, Perth, and relaying with new Baltic sleepers, at the same time I was permitted to lay alongside the Baltic sleepers four well-seasoned silver fir ones, which were cut from a tree on the Logiealmond Estate, to test their durability as railway sleepers. I visit these periodically at the end of each year, and last April I inspected them very minutely, and so far as I can judge they gave every indication of wearing out the Baltic ones. The price silver fir hitherto has been much about the same as that of Scots pine timber; but so soon as its worth becomes known as railway sleepers

it will open up an inexhaustible market for its timber, and its price will, I have no doubt, increase accordingly.

W. MCCORQUODALE.

HARDWOODS AT PENRHYN CASTLE.

HAVING in previous numbers of the *Journal of Forestry* given a descriptive list of the sizes attained by the rarer coniferæ and pines in the park here, I will now conclude this subject by drawing attention to the different hardwoods, chiefly those whose age and size qualify them for being brought under notice, and which consist of oak, ash, elm (English and Cornish), sycamore and Spanish chestnut.

Though none of these can perhaps be boasted of as possessing unusually large dimensions, yet this is to some extent equalized by the large number of each above the average size. With few exceptions, the trees enumerated here are all growing within the park, scattered over an extent of some 2,000 acres, the wall surrounding this being seven miles in circuit and about 16 ft. in height.

Oak.—The finest oaks are growing in close environ to the castle, many of which contain upwards of 150 cubic ft. of timber, with clean, straight boles rising to the height of about 70 ft.

The following are accurate measurements of two, supposed to be about the largest, the cubic contents of each being given irrespective of branches.

No. 1. Length of bole, 50 ft.; circumference of stem at three feet up, 10 ft. 1 in.; and containing 153 cubic ft. of wood. No. 2. Length of bole, 43 ft.; and girthing at three and five feet, 10 ft. 10 in., and 9 ft. 7 in.; and containing 170 cubic ft. of wood.

Ash.—This tree is growing profusely all over the estate, but principally as hedgerow or field timber, which may be attributed to the extensive use of the wood in the manufacture of many farm implements, tool-handles, &c., also to the tree being so readily reproduced from seed, and such facilities afforded the seeds for conveyance to a distance.

The quality of the wood is greatly affected by the soil on which the tree is growing, the best timber being that produced on damp, hazelly loam. The roots of this tree lie near the surface, and spread to a great extent, which with the shade of the head are very injurious to hedges or pastures.

Near the entrance to the village of Aber, and a short distance

from the old castle, once the residence of Prince Llewellyn, is a fine ash tree, girthing at three and five feet respectively 16 ft. 6 in., and 15 ft. 5 in. Another in the same parish, growing near the church, is 14 ft. 3 in. in circumference of stem at three feet up. Two more of the same kind, one growing within a hundred yards of the sea at Port Penrhyn, the other on a farm here, the first being at three feet from the ground 12 ft., and at five feet 11 ft. 9 in. in circumference of stem; the second at three and five feet, 18 ft. 2 in., and 16 ft. 8 in.

English Elm.—Several fine specimens of this tree stand in the park to the south-west of the castle, which have attained the height of over 80 ft., with clean, straight boles of uniform dimensions.

These trees are remarkable for their density of foliage and clustering habit of growth, and standing singly on a part of the park visible from the castle, they present when viewed from that point objects of great beauty.

The largest girths at three feet up 11 ft. 2 in., and at five feet, 10 ft. 9 in., and contains 233 cubic ft. of measurable timber.

Cornish Elm.—When viewed from a distance this tree closely resembles the Lombardy poplar; it is, however, more branched, and the habit rarely so fastigate as in that tree. It has been extensively planted on this estate, and several now stand more than 70 ft. in height, and with a circumference of stem at three feet up of 7 ft.

In the formation of a young plantation here some time since, which contained over 30 acres, this tree was planted 16 ft. apart all through by the wish of its noble owner, the spaces between being filled up with *Pinus laricio*, *P. sylvestris*, and the common larch. It is a tree which cannot be extensively planted, as the difficulty of procuring the true variety and its requiring to be grafted have made young plants in most cases very scarce and expensive. It produces seed very sparingly, and several unsuccessful attempts have been made to raise it by this means.

During a severe gale last autumn a tree of this kind was blown over, and the timber used instead of the English elm in boatbuilding. A plank sawn from the centre of the tree was polished and preserved in the nursery along with a collection of woods, and the timber seems but little inferior to the species. The Cornish elm is admirably adapted for standing alone or along the outskirts of plantations, where its decided character can best be seen.

Sycamore.—This tree is valuable as being well adapted to withstand the injurious effect of the sea spray, and for this reason is freely interspersed throughout the plantations along the sea-coast here. It is the largest and most common, although by no means the most ornamental tree of the genus.

The timber, which is white and closely grained, is also susceptible

of a fine polish, and being in demand for turnery always commands a fair price. The wood, the produce of trees grown on this estate, is generally of very good quality, and being grown quickly is to a great extent free from knots.

Several measure $11\frac{1}{2}$ ft. in circumference of stem at three feet from the ground.

Spanish Chestnut.—The deep sandy loam resting on a dry open subsoil, of which many parts of the park are composed, coupled with the mild, damp atmosphere, is very congenial to the growth of this tree. The finest specimens are always found in or around the margins of a plantation, in a position sheltered from the prevailing winds.

On wet, retentive ground and exposed situations the tree rarely attains to a great extent, and often dies out altogether. On a low-lying piece of ground near the Ogwen River several trees of this kind were planted out as standards, but, although sheltered on all sides by surrounding woods, the trees gradually dwindled away one by one, until now only a few are left, and these evidently are fast following their predecessors, the foliage being scanty and many branches masses of fruit, which is always in young trees of this kind a sure sign of decay.

The following are measurements of two of our best :—No 1. Girth of stem at three feet up, 12 ft. 6 in., and at five feet, 11 ft. 7 in. No. 2. Girth at three feet up, 10 ft. 1 in., and at five feet, 9 ft. 9 in.

Walnut.—Only a few trees of this kind have been planted here ; the largest is, however, a fine specimen, and stands at Tanrallt, near Bangor.

At the ground level this tree divides into two massive limbs, measuring in circumference at three feet up 9 ft. 9 in. and 9 ft. 6 in. respectively, with a diameter of spread of branches of 96 ft. It was planted 130 years ago, and seldom fails annually to produce, and bring to maturity, a large quantity of fruit.

The timber is used in this country for gun-stocks, being much lighter in proportion to its strength than any other wood ; in cabinet-making also it fills an important place.

Wild Cherry or Gean (Cerasus sylvestris).—Excepting this, none of the other kinds of cherry can be classed among our timber trees. The bird cherry (*Cerasus padus*) reaches, however, the height of 30 ft., and is very ornamental, as well as affording good game cover. The fruit, though greedily devoured by birds, is very nauseous to the taste. The wood of the wild cherry is hard, closely grained, and takes a fine polish.

On low, sheltered ground it attains a large size, and produces excellent timber, much sought after by turners and cabinet-makers.

The largest is 54 ft. in height, girth at three feet up 6 ft. 7 in. in

circumference of stem, and contains 88 cubic ft. of measurable timber.

Lombardy Poplar.—This is a good hedgerow or field tree, as its shadow is very harmless to crops in its vicinity. In or along the margins of plantations it has a fine effect when judiciously placed; the timber is, however, almost worthless when exposed to the atmosphere, and therefore unfit for many purposes in forestry. It luxuriates in rich soil and on the banks of a stream to which its roots can have free access. The largest tree here girths, at three feet, 10 ft. 5 in., and at five feet, 10 ft. 4 in., and the taper is inconsiderable, as at ten feet it girths nearly as much as at three feet. It is growing in rich, deep soil, on the banks of a mountain stream, and at a considerable elevation above sea-level.

Beech.—A number of fine beech trees are distributed throughout the park, especially on the sloping ground to the north of the Ogwen River.

The timber is clean and well-grown, and many trees contain over 100 cubic ft. of wood, with stems girthing from 8 to 11 ft. at three feet up. Beechwood is not generally very valuable, the average selling price in this district being from 6d. to 10d. per cubic foot.

It is very superior as firewood, and makes excellent charcoal.

ANGUS D. WEBSTER.

THE ELGIN NURSERIES.

WHEN in the north of Scotland with the Arboricultural Society in August, a small party of Members paid a visit to the Elgin Nurseries, belonging to Messrs. R. and A. Morrison, now represented by Mr. Alexander Morrison, and as a good example of the industry and energy which are devoted to the nursery business in that part of the country, we feel sure that a description of them will be interesting to our readers.

These nurseries were established about the year 1822, by the late Mr. Forbes, in whose family they remained till the year 1836, when they were purchased by the late Mr. George Morrison, father of the present proprietor. The extent was then only about four acres; year after year additional ground was taken by Mr. George Morrison and his son Robert (who died in 1876), and two years ago Mr. Alexander Morrison added nine acres more. The nurseries now extend to upwards of forty acres, and are the largest north of Aberdeen. We were shown over the grounds by Mr. Morrison and his intelligent manager, Mr. James Reid. We first visited the grounds at Pinefield, where the nursery was originally established, lying on the south side of the old coach-road leading from Elgin to Fochabers. Here are the

manager's house and nursery offices, and greenhouses. We enter the ground by a handsome iron gate, on each side of which stands a fine weeping ash tree fully fifty years old. The approach is very beautifully laid out with all kinds of conifers, from one foot to 20 ft. in height, some of them in cone, golden and other yews, hollies, &c. The golden hue of various trees was very much admired. The greenhouses, pits and frames are very extensive, and are principally devoted to the propagation of conifers, rhododendrons and hollies, clematis and other climbers, greenhouse plants, with a good collection of stove plants. Rhododendrons and hollies are made specialties. In two of the cold pits, each 60 ft. long, we saw upwards of 6,000 Golden Queen hollies grafted in heat last August, and now planted out, besides many thousands of golden yews, all in first-rate condition. The herbaceous ground is well stocked with the most approved plants of this class. This part of the grounds, known as the home nursery, also contains many thousands of limes, sycamores, poplars, elms, Norway maples, and mountain ash, all from 6 to 10 ft. in height, and in first-class condition for sending out, being mostly transplanted last autumn, and safe to lift, with splendid roots. There are also extensive collections of all sizes of the best hybrid rhododendrons, heaths and other American plants.

On the other side of the road are the Leper lands, so called from there having been a hospital for lepers on the lands in question several hundred years ago. It may be mentioned that Elgin was once surrounded by walls, and, as in the East, those afflicted with leprosy were compelled to live beyond the walls.

The workpeople, in trenching the ground many years ago, came upon some graves which must have been those of lepers who had been buried there. Here we inspected a large and varied collection of very fine, strong, well-grown roses, containing all the newest varieties, fruit trees, gooseberries and currants, seedling and transplanted forest trees, including larch, Scotch fir, spruce, elms, poplars, &c. Near this ground Mr. Morrison pointed out to us the site of a celebrated hole called the "Order or Ordeal Pot," which was supposed by the common people to have no bottom, and there are authentic records in the old presbytery or ecclesiastical books of Elgin, that old women, some centuries ago, had been drowned in it for witchcraft. The hole was filled up this year by rubbish removed from the deepening of a small stream passing the Nursery ground, thereby dissipating the vulgar idea of its want of bottom, and on the site is now growing very fine barley.

We next visited the Seafeld Street and Guildry Grounds, on the south side of Elgin, which are chiefly devoted to the growth of forest trees of all kinds, especially larch and Scotch fir. In one square of

about two acres we saw upwards of ten millions of one-year Scotch fir, the true native Highland pine, all grown from seed collected by Mr. Morrison's own collectors, and taken out of cone in his own kilns. In an adjacent square we inspected a number of beds of one-year larch, each 165 yards long, which we were told contained upwards of twelve millions, eight millions from seed collected in the Highlands of Scotland for Mr. Morrison, and extracted from the cone in his kilns, and four millions from imported seed. All the plants looked exceedingly fresh and healthy and could not fail to excite the admiration of any practical forester or gardener. In other parts of the same ground are hundreds of thousands of transplanted larch of various sizes from 1 to 3 ft., Scotch fir from 12 to 18 in., birch from 2 to 3 ft., Norway maple, poplars, sycamores, mountain ash, thorns, beech, hollies, alder, Irish and English yews, and other trees and shrubs too numerous to mention. Besides the seedling Scotch fir and larch mentioned above there are many other beds of these throughout the Nursery, containing several millions of plants, also numerous beds of seedling spruce, *Pinus Austriaca, laricio, maritima, montana, &c.*

Our next visit was to the ground recently taken by Mr. Morrison, consisting of a field of nine acres, on which nursery stock had never been grown. The field was first thoroughly cleaned, and is now covered with fine healthy nursery stock, principally Scotch fir and larch of large size, silver fir, for which the ground is well suited, alders, elms, and oaks, also seedling oaks, sycamore, thorn, and many other kinds of forest trees. Mr. Morrison pointed out a brake of transplanted larch, three years old, and asked us if we saw any difference in the appearance and growth of the trees; there was certainly a very marked difference. The trees on the one side of the brake were healthier looking, and of a deeper green glaucous hue compared to the others, which had a pale-green look about them. Having asked an explanation, we were told that the trees with the healthy glaucous appearance were grown from native Scotch seed, and the others from Tyrolese seed, which was convincing evidence that larch from home seed are hardier, and can withstand the cold climate of Scotland better than those grown from foreign seed. Mr. Morrison also mentioned another test which came under his notice. Two years ago he laid down a square of forty beds with Tyrolese larch seed, but Mr. Reid, his manager, omitted, by mistake, to sow one of the beds in the middle of the square, and he did not discover his mistake until after he had sown all the foreign seed. Mr. Reid sowed the empty bed with home seed, extracted from the cone in the Nursery. The square was left for two-year seedlings, and in May of the second year the larch were cut with frost. Each bed should have turned out at least 30,000 clean-topped larch; but Mr. Morrison assured us he had not 7,000 out of

the foreign seed beds, whereas the bed sown with home seed produced 25,000 clean trees, untouched by frost; a convincing proof of the hardiness of the larch grown from home seed, compared with foreign seed.

We also inspected the kilns used for extracting Scotch fir and larch seed from the cones, and Mr. Morrison explained his mode of extracting the seed. The floors of the kilns, on which the cones are laid, are of wood, which is preferable to metal rods, though entailing greater risk of fire. We were told that the utmost care was required in raising the necessary heat as the wood is apt to get very hot and dry, whereas with a metal floor there is less risk of fire, but greater danger of overheating, thereby destroying the germinating power of the seeds. Mr. Morrison is the largest collector of forest tree seeds in the North of Scotland. He showed us his stock of Scotch fir cones, about 3,000 bushels held over from last year in view of the failure of the crop this season, which is likely to entail a scarcity of seed; indeed it is already selling at double the price it fetched last year. This firm also undertakes hill planting by contract. In the season 1878-79 they planted for three proprietors in the North upwards of 350 acres, chiefly with two-year and one-year Scotch fir, all grown in their own ground, which shows the great resources of the nurseries.

The party were very much pleased with their visit and were courteously received by Mr. Morrison and his manager, who is a great enthusiast in his business, and showed that he knows trees and how to grow them to perfection.

TITHE RENT-CHARGE.

IT is not my intention to give the origin or history of tithes, although it would form a rather curious chapter. But it may be as well to note that it was some time after the establishment of Christianity in England before they were made compulsory. The reason of their being made so was because the Saxon became dilatory in rendering up to the Church the tenths of the fruits of his toil.

The Church until the Reformation, in return for tithes, to which were gradually added certain fees, undertook to grant a pass to the realms of bliss, but did not (as is popularly supposed) undertake the support of the poor, as there were no poor then in the same sense of the word as now. The lower classes being serfs or slaves, their masters were bound to support them in sickness and old age. Neither did the Church educate, only for its own purposes, and not for the general good.

It may be a question that as the Church of England does not

guarantee man's salvation, how far it is entitled to tithes, for undoubtedly this was part of the original compact, and the expression "cure of souls," indicates the obligations and duties of the clergy; but into the religious aspect of the question it is not my intention to enter. All tithes belonged to the Church or monastic establishments, but generally speaking they now belong to three classes of owners, namely, private individuals; either granted to or bought by them at or subsequent to the Reformation; cathedrals, colleges, &c., mostly granted by different sovereigns previous to the Reformation; and third, the clergy for the "cure of souls."

I have not statistics by me, but it is safe to say that the clergy do not come in for a third of the tithes in England.

Tithes were mostly paid in kind until the year 1836, when the Tithe Commutation Act was passed. This Act converted them into a money payment, called the Tithe Rent-charge; this rent-charge being arrived at from the prices of wheat, barley, and oats, sold in some of the principal market towns, and on an average of the seven preceding years. Now this process is cumbrous, and worse, it does not really arrive at the true value of the produce of the land. It is alleged that as this average is arrived at from corn actually sold, it represents the top price, the best of each sort only being brought into the market, whereas the middling and inferior sorts being either consumed at home or sold privately for special purposes are consequently not reckoned in the averages, and in this way they are raised too high. That there is ground for such a complaint is evident, and it was sure to come to the front in the present depressed state of agriculture. This and other important reasons, among which the following may be mentioned, point to the necessity for a re-adjustment of the tax:—

1. That good land is not more productive than it was forty or fifty years ago, while rent, rates, labour, &c., have increased, leaving less profit.

2. Much of the then middling and inferior land is now more productive, and therefore could bear more tithe.

3. A great quantity of common land, which at the date of the commutation was not tithable, may now be classed as good and middling, but still is tithe free.

4. A good deal of the best land is by prescription free of all tithes, the reason of this being that it was owned by religious establishments, and whatever abuses may have crept into the Church, it did not "rob Peter to pay Paul," but such land in the hands of private owners should be tithable.

5. The subdivision of land that has taken place since the original apportionment was made, has rendered it comparatively useless, and

if to this is added that the original was in many instances faulty and inaccurate, it becomes an absolute necessity that a re-apportionment should be made in the interest of both tithe owner and payer.

A Parliamentary Committee is at present sitting on the question of Extraordinary Tithes: these are an increase on the ordinary tithes when the land is turned into market gardens or hop grounds. A writer in the June number of the *Journal of Forestry*, page 75, says: "The proposition that the ordinary tithe be in every case paid by the landlord, who in letting a farm might add this amount to the rent, appears a reasonable one. But after all, when we look closely into the matter, shall we not arrive at the conclusion that the tenant-farmer who has been for many years upon the land, and has reaped the full benefit of the high prices of corn during the preceding seven years, is the proper person to pay the increased tithes?" This reasoning may be sound so far, but it is not always applicable. Take the supposed case of seven fat years for the farmer, whose term expires at the end of the same and at the commencement of the lean years; of course his successor has to pay the tithes on fat years with a decreased produce. Surely, therefore, it would be fairer for the landlord to pay the tithes than the incoming tenant, who has absolutely reaped no benefit from the previous years; this also shows that some alteration is necessary as to the incidence of this tax. The same writer goes on to say, "Mr. Chamberlain's reply to the deputation from the Essex Chamber, to whom he lately gave an audience upon this important tithe question, was to the effect that, 'If there had been no Tithe Commutation Act, the tithe would have been much higher than at present, in consequence of the great increase in the productions.' This shows that at least there are two sides to the tithe question." Yes, there are undoubtedly two sides to most questions, a right and a wrong, and Mr. Chamberlain's is the *wrong*; for unless in exceptional cases, such as market gardens, &c., the best land has not increased its productions since 1836, while the cost of tillage has increased; the middling and inferior may have done so to an appreciable extent, but then again it must be remembered that much of the good land is tithe free. Of course I do not mean to say that the total produce of the country is not increased since tithe was commuted, but I mean to say that the produce of *tithable* land is not increased to such a degree as to warrant Mr. Chamberlain's assertion. The same writer says: "But the liability to pay extraordinary tithes hinders the profitable cultivation of vegetables and fruits upon much of the poorer soil in the neighbourhood of London which might otherwise be profitably worked as market gardens. Looked at even in the most favourable light it is a direct tax upon industry and enterprise." In this I agree, but must add that I am afraid most direct taxes are taxes

on "industry and enterprise," and I fail to see the injustice in increasing the rent-charge when the value of the produce is increased, as it must not be forgotten that tithes are a proportion of that produce; but it may be relatively an injustice if, when the produce is diminished, no reduction is made in the tithe. As an evidence of the partiality of the tax I know of a piece of rich land, thirty acres in extent, which pays what is called a "modus" of 2s. 6d. Now supposing this piece of land was divided into sixty lots, of half an acre each, this would give a tithe of a halfpenny per lot, but then the Tithe Commissioners will not allow a subdivision of so small a sum, therefore one of the half-acre pieces must be saddled with the whole, the owner of which can, however, at some expense, get this apportioned on the other lots, but he must collect the halfpence himself, and pay the tithe owner the 2s. 6d. Again, I manage a small estate, situate in three parishes: the house and about twenty-five acres of very good land is in the parish of R., but is free of all tithes, why I know not, as it is not mentioned in the apportionment, nor shown in the map attached to the same. Another portion of rather inferior land in the parish of T. pays 2s. 6d. per acre, and the other portion in the parish of M., is middling land, but pays 7s. 6d. per acre.

These are not isolated cases, and they might be multiplied *ad infinitum*, and I do not believe it possible to defend tithes as at present levied. No tinkering alterations or amendments will be of any use, and I therefore suggest that a short Act should be passed to levy them on the basis of the poor assessment on all property liable to be assessed to the poor, and that a fixed sum should in this way be raised without any reference to the value of produce; that is to say, if the tithes were commuted at £250, let this sum be raised, neither more nor less.

JOHN SMITH.

GORDON CASTLE.

AS mentioned by us last month, a party of the Scottish Arboricultural Society, on the day after the excursion to Darnaway Forest, paid a visit to Gordon Castle, the princely seat of the Duke of Richmond and Gordon, situated on the eastern border of Morayshire, near the mouth of the Spey. The castle stands on the level plain stretching inwards from the Moray Firth, and is surrounded by extensive policies which are justly celebrated for the richness of their sylvan beauty and the numerous grand specimens of ancestral trees which thickly adorn them. Under the courteous leadership of the well-known veteran gardener and wood manager, Mr. Webster, the

party were first shown through the extensive and beautifully kept gardens and pleasure grounds; remarkable alike for the taste with which they are designed, and the great experience and ability displayed in their management, to which the well-filled houses and borders and abundant crops most amply testify. In and around the pleasure grounds the party were shown many splendid examples of remarkable trees. Oaks, elms, ashes, limes, beeches, chestnuts and other trees are all met with of stately proportions; some with tall, straight columnar stems, the *beau idéal* of a forest tree, others with no length of stem to speak of, but of giant girth and picturesque aspect, while many display great luxuriance in their umbrageous heads, with the lower branches sweeping the ground and completely hiding their massive stems from view. At a short distance from the castle stands a magnificent lime tree, known as "The Duchess' Lime," which rises from the greensward to a height of about 90 ft., a perfect pyramid of light green foliage. The massive fluted stem measured 16 ft. 4 in. at five feet up, and the wide-spreading branches descending to the ground, and extending to more than 100 ft. in diameter, have taken root, and afford a substantial support to the parent tree, while the leafy canopy thus formed around the stem presents a tempting cool retreat from the blaze of the midday sun. Not far from this beautiful lime stands a grand old walnut tree, said to be the finest in the north of Scotland. It girths 12 ft. 8 in. at one foot from the ground, and 13 ft. 6 in. at five feet up. Many other noble trees which adorn the grounds and park were seen and greatly admired, but time pressed too much on the movements of the party for measurements to be taken. A fine group of ancient hollies attracted special notice by the gigantic proportions of their stems and the hoary, aged appearance of their weather-beaten heads. The holly appears to be indigenous here, and grows in great abundance. It forms quite a feature on the "Holly banks," along which a charming walk leads from the castle to a neat summer-house, on a commanding site in a distant part of the park, from which a magnificent view is obtained of the surrounding country, the broad expanse of the Moray Firth, and the distant mountains of Ross and Sutherland. The grounds around the summer-house are skilfully laid out on the site of an old quarry, and form an attractive and secluded retreat from the more open grounds around the castle. The steep grassy slopes are tastefully planted with choice trees and shrubs, among which the newer coniferæ are thriving admirably. A grand specimen of *Picea lasiocarpa*, about 25 ft. high, attracted special notice by its graceful habit, silvery foliage, and healthy, well-furnished appearance. In a hurried walk through a portion of the Deer park, a great number of

fine trees were seen; several larches being met with over 100 ft. in height, and girthing from 7 ft. to 8 ft. at five feet from the ground. One of these larches attracted considerable notice by its curiously picturesque habit, and great girth at the usually accepted point, five feet up. On applying the measuring-tape at that height from the ground, the tree was found to girth 28 ft.! This enormous girth was produced by a giant limb springing almost at right angles from the bole, and then shooting upright in tree-like form, at three feet from the ground. This limb measured 10 ft. 6 in. in circumference at one foot from its base. The true bole of the tree measured 17 ft. in girth at the smallest point between the ground and the base of the limb. Passing on through the open park, a plantation was entered in which it is safe to say the heaviest crop of Scots fir is now growing that is to be seen anywhere in this country. Straight, clean, cylindrical stems, towering aloft without a branch to a height of 70 ft. and more, and of great girth, stand so thick upon the ground that the eye cannot penetrate far into the depths of the forest amid their colossal trunks. These and other extensive plantations on the Gordon Castle estates deserve a visit from the Scottish Arboricultural Society,—the district abounding in woodlands, and furnishing material for a profitable Excursion. A glance at a large and well-appointed saw-mill, chiefly employed in the conversion of home-grown timber for use on the estate, and an inspection of the extensive and well-arranged premises of the home farm, with its famous herd of shorthorns, sufficed to fill up the much too limited time the party had at its disposal for inspecting such a splendid domain.

THE COMMON ALDER (*Alnus glutinosa*).

THE common alder belongs to the natural order *Betulaceæ*. It has roundish wedge-shaped wavy serrated leaves, downy at the branching of the veins beneath. The flowers are terminal greenish white, appearing earlier than the foliage in pendulous catkins. The seed is of a brownish colour and ripe in October. The tree is found growing on the continent of Europe from Lapland to Gibraltar; in Asia from the White Sea to Mount Caucasus, and also in the North of Africa. But although it has a wide geographical range its growth is more luxuriant in temperate regions. It prefers a moist soil in the vicinity of water, and will succeed on peat (if not too deep) better perhaps than any other of our forest trees. On moderately good soil near water, it sometimes attains the height of 60 ft., and is supposed to arrive at maturity in sixty years. It makes a good nurse on soils that are not too dry, but permanently it does not associate well with other trees.

Although the common alder is at no season of the year very ornamental, yet it is by no means unsightly. As a variety in a young mixed plantation it contrasts favourably with some of our other forest trees, and has a pleasing effect. It is seen in its best aspect, however, when growing by the side of a river or stream, with its branches overhanging the bank, and its green pendulous twigs skipping on the surface of the dancing waters. Or as a green fringe encircling some dark lake or damp forest glade where the bog myrtle springs up among the green mosses and flaxy mountain down. Although the alder is termed an aquatic, having a strong affinity for water, its constitutional vigour soon becomes affected if the land in which it is planted is water-logged. It is not subject to the attacks of hares and rabbits, for unless much pressed for food they will not touch it. Nor is it so liable to injury from insects or frost as other forest trees, although it is generally more exposed to the latter than any other tree. As a forest tree it is generally very unfairly treated, seldom or never in requisition until some portion of ground is considered too poor, wet and cold for any other tree, it is then frequently plunged into soils surcharged with stagnant water, and if it does not take to them like a bulrush it is denounced at once as unsightly and unproductive. When properly treated, however, few trees grow better or pay so well. It is grown more extensively in this country as coppice than as a timber tree, on account of its rapid growth when young, frequently attaining the height of 20 or 25 ft. in ten years.

The growing of alder as a coppice crop requires very little practical knowledge of forestry. All that is necessary is to drain off the stagnant water in the soil and plant the young trees from 4 to 5 ft. apart, and allow them to grow together until they attain to the size most in demand in the local market. When the first crop is cleared off the drains should be scoured, and the fences repaired; two years after, the shoots may with advantage be thinned out, and then allowed to grow for the same period without any further trouble. The straighter, cleaner, and more free from knots and joints the poles can be grown, the more remunerative the crop; hence the advantage of planting somewhat close, and the removal of inferior, crooked shoots. The poles are chiefly used for rake-ware, hop-poles, stakes, household faggots, and the manufacture of charcoal for blasting powder. Twenty pounds an acre has been frequently realized in ten years for alder coppice. When grown as a forest tree the timber is used for cabinet making, turnery, and wooden vessels, such as kneading-troughs, basins, plates, &c. It is also used for clogs or wooden soles for shoes. For the latter purpose 8d. per cubic foot is readily obtained for alder, lying where felled in the wood, in this part of the country (South Wales). The clogmakers pitch their tents

in the wood, or on its margin; and after cutting up the timber into the required lengths, convert it into soles under cover.

The young bark of the alder mixed with valonea has been used on the Continent for tanning with good results. The adaptability of the alder to poor, wet soils, its luxuriant growth where other trees can hardly live, and its value as a timber or coppice crop, ought at least to raise it in the estimation of arboriculturists, and set it free from the mean aspersions to which it is frequently subjected. Although poets sing not its praises, nor artists admire its beauty, yet it does more in its humble way to beautify the earth's cold, cheerless places than any other tree.

ANGUS MACINTOSH.

WISTMAN'S WOOD.

THIS curious assemblage of dwarf oaks is among the oak woods which the fairies quitted reluctantly and late. It is situated in Devonshire on the slopes of the West Dart, not far from its source, high up in Dartmoor. The trees are all dwarfs, apparently of the same age, and growing on a singularly unfavourable site. Those who have seen these oaks, and are aware that the wood was described in a perambulation of the moor, dated soon after the Conquest, as having then been in much the same state as it is now, will find no difficulty in believing them to be at least 2,000 years old. They owe their preservation to an effectual defence, in the shape of a number of large stones which cover the site on which they grow, and amid which the venerable dwarfs lift their branches. The trunks of the trees are about the height of a common stool, such as clerks sit upon, and I sat down on the crown of one in passing, and leaned upon the main limbs. The bole of this tree was about 3 ft. high, and its total height to the topmost branches 15 ft. The trunk was hollow, but still full of life. Its circumference was 6 ft. It was at its prime probably about the height of an average oak; this must have been at the period of the Norman Conquest, and it is still, as tough a dwarf, for a tree, as the notorious Quilp was for a man. Time-worn as the stems and trunks are, they are well covered by their spreading and flattened heads. Seen at a distance in August, a sheet of green seems spread upon the hill-side. I do not remember oaks more uniform in the character of their umbrella-like heads, or with foliage of a brighter green. Whether the trees were planted by man or by nature, their security is due to the sheltering blocks of granite amid which they stand, and to the moss-covered props and slabs on which the branches rest.

There is, I think, no apparent reason for concluding that this was a

planted wood. It is true no acorn springs at present, and even where the branches of youngest wood lie along flat stones, embedded and sopped in moss, under the most favourable circumstances for emitting roots, they fail in that common means of reproduction in consequence of the smallest branches even being too old, hard, and tough. When therefore the old trees crumble a thousand years hence, they will leave no successors.

According to common report, Wistman's Wood swarms with vipers. It is a damp and unlikely site for reptiles of this kind, and perhaps the rumour may be in some way connected with a common legend attaching to several historical trees. A serpent guarded the Golden Fleece, and the apples of the garden of Hesperides, and a sleepless snake was coiled around the Yggdrasil.

There was a widespread persuasion in Devonshire that the Druids found mistletoe in Wistman's Wood, and collected it with great ceremony on the occasion of an annual festival; but this must be an error, and the derivation of the name of Wistman's Wood from that of the *wisemen*, *i.e.*, the Druids, is no doubt incorrect.

In the extensive forests of ancient Britain, when the atmosphere was damper and less moved by wind, the mistletoe may have grown on the oak more generally than at present. It fastens now on more than a dozen sorts of trees, including the fir, yet it almost invariably avoids the oak. Mr. Jesse, the surveyor of Her Majesty's parks, failed to discover it growing on the oak even in a single instance. But this "branch of spectres," which still covers the apple orchards of the Isle of Avelon—that stronghold of Druidism—does sometimes strike root on the oak in sheltered situations. In the great oak wood of the Weald of Sussex there is at present, if the tree has not been felled very recently, a specimen at Burningfold Farm, in the parish of Dunsfold. The Society of Arts obtained a specimen some years since in Gloucestershire. This is not very far from the site in question, where one would gladly affix the mistletoe to the banks of the Dart, and confirm the story of the sacred grove, and prove our wood as old as Cæsar and contemporary with the birth of Christ. But the mistletoe, which thrives in Siberia in certain situations, does not climb in England higher than 500 ft. or 600 ft. above the level of the sea, while the highest trees of Dartmoor exceed 2,000 ft., and the site of Wistman's Wood is not much less.

With regard to the age and name of this mysterious wood, the name seems to be connected with the legend of the Black Huntsman, otherwise called Wistman, and descended from Woden, whose spectral pack of Wist hounds hunted here on wild nights, when they might be heard as they drifted over Dartmoor at full cry, or passed among the branches of these weird oaks. It would not appear unreasonable that

a situation so congenial should have been selected by the famous Wistman or Wishman, as one of his numerous hunting-grounds.

Whatever surmise as to the origin of its name we may prefer, the age of the wood cannot be settled etymologically. Was it primeval or planted? Captain S. P. Oliver, R.A., who was employed on Dartmoor making a reconnoissance previous to the autumn manoeuvres of 1873, stated in a letter to the *Gardener's Chronicle* that there is, high up the valley of the Erme, another small wood of scrubby oak bushes named Pileswode, from the stakes or piles by which each tree was surrounded for its protection. Pileswode was evidently a planted wood, as shown in an ancient map of Dartmoor of the year 1241. Captain Oliver believes that Wistman's Wood was also a planted wood, and attributes the planting to the Scandinavian miners who visited this part of England a thousand years before the Conquest, and even previous to the destruction of Tyre by Alexander, at a period when the ancient ports of Plymouth, Dartmouth, and Falmouth were frequented by Phœnician traders.

H. E.



THE HOME FARM IN OCTOBER.

STEAM CULTIVATION, wherever available, should continue throughout the month, in order that the land may be well prepared for seeding or for the pulverizing effects of winter frosts. For the clay land farmer the aid of steam is indispensable, if advantage is to be taken of the short season between harvest and planting for thoroughly cleaning the land. The benefits, both mechanical and chemical, which follow deep steam cultivation, commend it to the consideration of the cultivators of heavy soils.

Sowing.—Sow rye, winter tares, oats, barley, and beans, as soon as possible, if these are not already in the ground. Thin sowing may be preferable upon clean land; but without very careful spring hoeing and cleaning, it will not prove successful upon the majority of soils. Seed corn should be selected with care; and wherever there is any doubt about the sample, a small quantity may be submitted to heat. About two bushels of good wheat should be sufficient for an acre. Increase the quantity as the season advances. Secure a firm seedbed if the germination is to be regular. If placed beyond the reach of the heat of the sun, much of the seed fails. One pound of blue vitriol to six bushels of wheat will prevent smut.

Hops.—The poles should now be stripped and stacked, the alleys upon wet soils being first struck out with the plough to keep the land dry through the winter. Next comes the clearance of the bine,

which may be used at once to bottom the yards, or stacked for winter bedding. With higher wages and inefficient labour the ploughing of hops has become more general. If digging is done too early in the season the soil frequently settles down and becomes very close after heavy rains. Cart off old poles, and carry on new ones and manures as circumstances permit. Also dig in rags, bones, and chalk, where such dressings are used.

Root-crops.—Dig potatoes and store them after thoroughly drying. Never put these in a loft, but either pit them or clamp and well cover them upon a basement floor. Secure the mangolds before frosts touch them, and draw and clamp white turnips, swedes, and carrots for winter use. Nearly all these crops keep better if allowed to lie a short time in covered heaps in the fields before being stored in bulk.

Live Stock.—Feed horses liberally, as their work will now be heavy. Wean colts and give them good shelter by night. Increase the allowance of cake to fattening beasts, and add corn or decorticated cotton cake where the grass is luxuriant. Put ewes upon rape, and turn the rams with them early in the month. Give dry food to sheep now upon turnips, and place salt within their reach. In all stock feeding, combine fat and flesh-forming ingredients. Pulped roots mixed with chaff, and allowed to lie long enough to produce fermentation, will do much more good than can be attained by the separate use of these foods.

Irrigation should commence with the first floods from the brooks or rivers, as these contain more valuable substances than are to be found in the water later on. Keep the water off the meadows during frosts. Clean out carriers, repair hatches, fill up hollows, and have everything in readiness for flooding.

Dairy.—Give plenty of dry food to the cows, and keep them as much as possible from pastures overshadowed by elm and ash trees, as the leaves injure the butter. Give them comfrey, lucerne, grains, or even a few roots.

Poultry.—Feed up turkeys and geese, allowing them to range the stubbles during the early part of the month. Force fattening ducks, so as to get rid of them before winter.

Estate Work.—First complete the sowing, and then turn the horses to estate work, as the farm work will permit. Gather leaves, cart materials for repairs, lay in fuel, &c.

A. J. B.

FOREST FIRES IN THE UNITED STATES.

THE forest fires which have recently desolated certain sections of the United States appear, says a writer in the *Standard*, to be of more than ordinary magnitude. Over most of the settled part of North America the timber has been cut down so recklessly that long stretches of unbroken forest-growth are getting rare in localities to the east of the Mississippi. Already the State Governments have become alarmed at the rate at which their most valuable natural crop is being destroyed, and in some cases, after it is too late, are devising measures whereby the trees, which have been so unadvisedly hewn down in places where the soil was not really required either for mining, building, or agriculture, can be replanted. The northern parts of Michigan are, however, among the few tracts which are still to some extent covered with their primeval forest. In this district little rain fell for nearly two months, and as a result fires broke out here and there, but at first they seem to have done comparatively little damage. After a few days, however, a storm of wind swept over the peninsula, carrying with it the flames, which in a few hours consumed everything in their course. The terrified settlers fled panic-stricken, trying to hide themselves in wells and caves and pits to obtain shelter. But their efforts seem to have been in vain, for, while many escaped, the latest reports represent the country as one blackened waste, in several townships scarcely a house remaining to mark the site of flourishing farms or happy homes, the crops consumed, the fences burnt up, and the owners, in too many instances, burnt alive. It is estimated that upwards of five thousand families are ruined. The dead are already known to number about two hundred, but it is believed that fully thrice as many have perished.

The great forest fires of 1881 will doubtless leave their permanent mark on the country, and, even were there no danger of another outbreak, they are certain to throw it back for many years. Such woodland fires are, of course, no new feature in the history of the United States, though of late years they have been less extensive than formerly, owing to so much of the country being cleared, and the means of controlling them having, by the increase of the population, become more abundant. They are often attributed to hunters or Indians leaving camp fires unextinguished. Undoubtedly this was, at one time, often the cause of great stretches of wood and prairie being fired, and in some cases it may be so still. The wayfarer in these wild regions is not over-anxious for what the morrow may bring forth, and to take pains to "drown out" the wood fire at which he has boiled his kettle before starting off on his morning's tramp—merely out of regard for the possible consequences—will hardly be a circumstance likely to enter his mind. However, the agency of man is not the only cause of forest fires. No sight is more familiar in a forest region, where most likley human foot has never pressed before, and where there are neither Indians nor hunters, than mile after mile of country dotted with the blackened stumps which stand grim monuments of the flames that at some recent

period have swept across the region. Such spots are often found in the wooded regions of the less known parts of North America. It is also a common subject of observation that flames will be seen bursting out in the woods high up on the sides of mountains where there are no hunters, and have been none for months past. These sudden fires are noticed invariably after a long continuance of hot weather, when the air is close and sulphurous, and the moss on the bark of the resinous pine and fir trees as dry as tinder. They are then ready to be ignited by a flash of lightning, or, as is quite as often the case, by the heat generated by two trees rubbing against each other.

If, as not unfrequently happens after a summer of forest fires, heavy rains fall, a conflagration of this sort is speedily drowned out. But should a high wind arise, as has been the case in Michigan, the flames might roar along on the lee of the breeze until they encounter a prairie, a lake, or some other burnt tract, when the fire will gradually die of natural exhaustion. If a party travelling on "the plains" of America see to their horror the flames of a prairie fire on the horizon behind them, their only hope of safety is to instantly rush ahead and ignite the grass in front of them, so that by the time the advancing fire in the rear overtakes them there will be a cleared spot on which to take refuge. The most curious feature about both forest and prairie fires is that no sooner has one passed over a district than plants and trees of different species from those which formerly grew there spring up. In Vermont hickory has covered spots where before the forest was destroyed by fire not a single tree of that species was known. The country round the head waters of the Delaware, Alleghany, and Genesee rivers, now covered with hemlock, beech, and sugar maple, was originally an oak forest; and in Georgia oak and hickory lands, when cleared, invariably grow up with pine. In the region about Green Bay, Wisconsin, overrun by the fires of 1871, dense growths of poplars and beeches succeeded the firs and deciduous trees destroyed. In the vicinity of the Slave Lake the land laid waste by fire produces nothing but poplars, in place of spruce, pine, and white birch, though none of the new trees were previously seen on the ground they now cover. In Alabama pine, under the same circumstances, is succeeded by oak; and—not to multiply examples of a curious fact—in Nebraska ash, elm, and bog elder follow cotton wood, and in Florida blackjack oak the long-leaved pine. The seeds of these trees seem to be lying dormant in the soil until stimulated into life by the passage of the flame, as was the yellow rocket, which made gay the waste places of London after the Great Fire, though the plant had previously been unknown in the district. Hence—and in a misfortune so sad it is pleasant to find some cause for satisfaction—the Michigan fire is not likely to permanently injure the land. If it has destroyed houses, fences, barns, cattle, crops, and, unhappily, their owners also, it will have aided in clearing some ground that needed clearing, and it may possibly end in giving an artificial fillip to the soil over which it has swept.



ENGLAND.

PLANTING should now receive the forester's careful attention, and every effort should be made to get the work well forward while the soil is still warm and before vegetation is entirely suspended. "Plant before Martinmas and *command* success; plant after Candlemas and *entreat* it," is an oft-quoted maxim which cannot be too frequently brought under the notice of the tree planter. Coniferous trees should be first transplanted, commencing with the larger ones; and afterwards those of a deciduous kind. The value of nurses as a protection to the hardwoods should never be overlooked. All new plantations should be laid out in accordance with a well-considered plan, so as to secure convenient clearance roads, and thorough surface drainage upon wet lands. A well-supplied home nursery is the first requisite to successful planting, as when well managed it ensures a plentiful supply of healthy trees with the least delay and the smallest amount of risk. Notching will be found the most advantageous system upon light soils and with small plants. Pitting is adapted to larger plants upon moderately dry soil. But a thorough steam cultivation or trenching will generally amply repay the whole outlay. The lighter soils may be well trodden or rammed down upon the plants; but in a wet season heavy soils should be trodden on as little as possible.

Seeds and Sowing.—The seeds of many trees ripen in October, when they should at once be collected and sown, or carefully dried and stored. Among these are the Norway maple, walnut, horse chestnut, birch, alder, ash, beech, and oak. The benefits of autumn sowing are sometimes shown in the young plants getting nearly a whole season's start of the spring-sown ones. All seeds should as far as possible be selected from healthy trees of a medium age and well grown. Cover the small seeds lightly and the larger ones about three times their own diameter. As the produce in plants of a bushel of seed of good quality we may take the following:—Oak, 6,000 to 8,000; Norway maple, 12,000; sycamore, 12,000 to 13,000; walnut, 4,000 to 5,000; horse chestnut, 2,000; ash, 12,000 to 15,000; beech, 10,000 to 12,000. Where the soil is wet the seeds are better sown upon raised beds and covered with the earth taken from the intermediate alleys.

Underwood sales should at once be arranged so as to bring the produce early into the market. Small lots will command relatively higher prices than large ones. Conditions of sale should include regulations for proper felling and early clearance. Well-cut stools and backing out the produce of the falls to convenient clearance roads will ensure the permanency of the coppice, while badly cut and jagged stubs, followed by the treading of horses and the grinding of wheels, will soon destroy half the produce. The small bill-hook or axe for the younger growths, and the heavier axe for stronger stools should always be used. Heavy and blunt tools frequently loosen the stool, and sever the young roots.

Draining by means of open watercourses should be attended to early in the month. All old ditches should be freed from leaves, grass roots, and rubbish of all kinds. As the trees attain size and their roots penetrate deeper, the depths of the ditches should also be increased upon wet soils.

Layering may still be continued in the woodlands and upon prepared stools in the plantation and nursery. Shoots which have completed their second year's growth are best adapted for this purpose. If firmly pegged down and covered with good soil, these will seldom fail.

Cuttings from the Portugal and common laurel, the alder, elder, lime, plane, poplar, dogwood, and many other trees may now be planted. Trees produced from *suckers* may be raised in the following manner:—Lay the roots bare and notch them freely; re-cover with sandy soil, and at the end of a year slip off the suckers and plant them out. Some small trees of the kind required may also be cut off at the ground at the same time that the roots are uncovered and notched: this will cause them to throw up suckers more freely.

Wash young trees as a preventative from rabbits, and more especially those taken direct from the nursery; undercut deciduous trees in the nursery, transplant hawthorn for hedges, turn and prepare composts for spring use, trench and manure in the nurseries, cut back two years transplanted oak and chestnut, and remove ash for future transplanting into beds which afford room for their development. Also cut off at about six inches from the ground young elms intended to grow shoots for layering.

Pluckley, Kent.

A. J. BURROWS.

SCOTLAND.

THE thinning and cleaning of young plantations may be continued as formerly recommended, and the felling and thinning of the older fir

and pine plantations ought now to be proceeded with. Have all thinnings removed to the roads as the work proceeds, and see that no branches are left in the drains to obstruct the flow of the water. Hardwood plantations and hedgerows intended to be thinned during the coming winter should now be gone over, and the trees to be removed marked off.

See that all plantation fences are in good order, and specially guard against the inroads of sheep or other stock into young plantations during the autumn and winter months.

As the crops are removed from the ground, have the cutting of all field hedges completed, the refuse collected and burnt, and the hedges cleaned about their roots where necessary. Prepare beds for young hedges, and begin the planting of those of thorn towards the end of the month.

Continue the removal and transplanting of evergreens, as recommended last month, and begin general forest planting in all dry situations so soon as the plants have well ripened off. Continue to fence, drain, and pit ground for spring planting.

As the nursery ground becomes vacant it should be deeply and roughly dug over, so as to expose the greatest possible surface to the influence of the winter frosts; all exhausted plots from which a green crop is not to be taken should be top-dressed with well-decomposed manure or other compost, before being dug over.

Prepare gravel and other material for repairing and improving roads and walks. Policy and general ground improvements, where extensive, should now be commenced.

Collect tree seeds as they ripen.

Darnaway, N.B.

D. SCOTT.

IRELAND.

No effort should be spared to get ground intended to be planted ready to begin the work of planting as soon as the young plants are ripened enough to move. When everything is in readiness, the planting out of evergreens may be begun; deciduous plants as soon as the leaves fall off. Early planting has everything in its favour; as usually the weather is moderately good, the plants will strike root better if planted before the ground becomes soddened with too much rain; and when autumn is taken advantage of for planting, much time is gained in spring for other operations. One point must be guarded against while following autumn planting, that is never to plant damp, moist places, or the result will be ruinous to the plants. Wherever too much moisture is, the ground ought to be drained at once and planted in spring.

This is the forester's seed harvest, and he should collect the

different seeds as they ripen. Haws, ash keys, and sycamore should either be sown at once or put into the rot heap until spring. It is better to sow seeds which vegetate the first year just as they ripen, and oak, ash, sycamore, alder, chestnut, &c., may all be sown when gathered. Seeds of most kinds appear pretty plentiful this season. Continue to prune ornamental groups of trees, and mark timber to be felled later on in the season. Prior to finally removing trees from ornamental groves, a good method is to pollard the condemned tree, and allow it to remain a year or two until the branches of surrounding trees spread themselves, which they will do, and the tree when cut will scarcely be missed. All should be done methodically, not in a haphazard or slovenly way, as it will take years to repair the loss of a tree sacrificed by a whimsical notion for felling.

Get the nursery into order for "lining out" seedlings. Rake leaves as they fall, and have them drawn into heaps to rot. Keep everything clean and tidy about the pleasure ground. When any mowing is done this month, the box should be taken off the mower, and the grass merely spread over the ground. This keeps a fine fresh colour on the grass, and the practice of not removing the grass may with advantage be further extended.

Ballinacourte, Tipperary.

D. SYM SCOTT.

WALES.

CONTINUE the fencing, clearing, draining, and preparing of ground to be planted this season, as recommended last month. When practicable, and the ground is of a stiff, tenacious nature, trench or subsoil ploughing will be found a good preparation. When the ground to be planted is of small extent and the planting of an ornamental character, or where immediate effect is desired, trenching is advisable. In trenching for planting it is preferable to keep as much good soil on the surface as possible, and loosen the bottom of the trench by picking, allowing it to remain instead of bringing it to the surface.

Planting may be commenced towards the end of the month, operating on the driest and warmest ground first. The thinning of young fir plantations should now be proceeded with, removing the thinnings and clearing all open drains and ditches of branches and rubbish as the work proceeds.

Look round all fences and tree-guards, and see that rabbit-proof netting and fencing is in good repair. Continue the switching and cutting of hedges.

Continue alterations and improvements in pleasure grounds, and other ground work, such as road-making, levelling, &c.

Kinnel Park.

LEWIS BAYNE.



THE Annual General Meeting of the Scottish Arboricultural Society is to be held, under the presidency of the Marquis of Lothian, in the Royal Botanic Gardens, Edinburgh, on Tuesday, the 4th inst., and from the excellent programme issued by the Society, we anticipate a specially useful and important meeting. Every member and arborist who can possibly manage it, should make a point of attending. We are pleased to notice a fair increase in the number of essays in competition for the prizes offered by the Society, and also that the useful subject for which the Proprietors of this *Journal* have offered a prize for several years, "On the Value of Tree Planting as an Investment, with Statistics of Cost and Returns," has at length produced an essay.

* *

The subjects chosen for discussion at the meeting—"The Deterioration of Spruce in this Country," and "The Measurement of Trees, with special reference to the Adoption of a more exact Method of Ascertaining their Cubic Contents for other than Commercial Purposes"—are certain to draw forth a variety of opinions, from which much useful information may be gleaned. The reports of the various Committees should also contribute largely to the interest of the meeting, particularly so when the subject of the education and training of our future foresters is attracting such a large share of public attention. It is here that the Scotch Society can make its experience and influence

most beneficially felt, and the report of its Education Committee will be listened to with deep interest by those who desire to increase the prosperity and usefulness of forestry throughout the British dominions.

* *

An important novelty of the forthcoming meeting, and one that will be warmly approved of, is the lecture to be delivered by Sir Richard Temple, Bart., in the Freemasons' Hall, on the evening of Tuesday the 4th, at which there is certain to be a large attendance. From the great experience and well-known ability and eloquence of Sir Richard, the evening lecture is likely to be the most attractive feature of the meeting. On the second day, Wednesday, 5th, the usual Excursion in connection with the meeting is to take place to the woods of Tynninghame, in East Lothian, renowned in arboricultural history as the scene of the labours of several tree-planting Earls of Haddington, and which at the present time will afford a capital day's outing to the members of the Society. We would again appeal to every one interested in forestry to be present at the ensuing meeting.

* *

We are informed that the visit of Indian and French forest students to some of the Highland forests, referred to in our last issue, commenced on the 16th ult. with a visit to the Earl of Seafield's magnificent woods in Strathspey, under the guidance of Mr. J. G. Thomson, the

wood manager. The party comprises Colonel C. F. Pearson, one of the heads of the Indian Forestry Department; Major Campbell; three French gentlemen, professors of forestry, M. Boffe, M. Reuss, and M. Bartet, with a number of pupils. In the course of the day the woods around Huntley's Cave, Drunindunan, and Tomvaich saw-mill were visited. Thereafter the party drove to the nurseries at the Dell of Abernethy, where they were joined by the Earl of Seafield, the Hon. T. C. Bruce, M.P., and Dr. Stuart, who accompanied the visitors to Tor Hill, &c., returning to Grantown at 7 p.m. On Saturday the party continued their observations, subsequently visiting the woods at Scone, Dunkeld, Blair Athol, Darnaway and Beaufort, and they were, we understand, both surprised and delighted with the splendid natural forests with which this district abounds.

* *

From every part of the country we hear of the abundance of the crop of wild fruits. Crab apples appear to be a heavier crop than has been seen for many years, and sloes are fully as abundant. The mountain ash is loaded with "Rowans," and the thrifty housewife is rejoicing at the prospect of the dozens of wine she can make from the abundant supply of elder berries. The yew is thickly sprinkled with its juicy scarlet berries, on which thrushes and blackbirds, besides smaller fry, are enjoying a rare feast. When these fail them, haws and holly berries, which are enormous crops, will keep up the supply of food for the woodland songsters till the return of spring. The store of such food has not been so large for a good many years, but we hope that the abundance of these wild fruits does not presage the approach of another severe winter, in accordance with the popular belief.

The suggestion that the slopes of railway embankments might be profitably utilized by planting them with trees has several times been made in these columns, and in the United States the experiment has been tried, we believe, with great success. A correspondent of our contemporary, *Land*, raises an objection to this, which, however, appears hardly worth considering. He says that during the fall of the leaf the drifting of leaves along the line would seriously impede the power of the passing engines by preventing the wheels from "biting" the rails, thus causing the engine to slip. It is quite possible that for two or three weeks during October there might be a sufficient collection of fallen leaves to have some such effect, but the leaves would soon get dispersed by the wind, while at best the objection only applies to deciduous trees, which in most situations would be better replaced by Scotch firs or larch. We hope this objection will not deter railway companies from carrying out what we consider a very valuable improvement.

* *

The Forres Nurseries, which formed a centre of attraction to the members of the Scottish Arboricultural Society during the late excursion to the district, were established in 1826 by the late Mr. John Grigor, the well-known author of *Arboriculture*, then a young man only twenty years of age. For upwards of half a century he laboured here with indefatigable zeal among the trees and plants he loved so well, and made his nurseries famous throughout arboricultural circles. Since Mr. Grigor's death, in May last, the Nurseries have been under the direction of Mr. Sim, by whose skilful management they fully maintain their former high reputation as forest tree nurseries. Forest trees of all kinds are well grown in large quantities, and the Scots fir, raised from seed of the native pine gathered in the district, is highly

esteemed for its hardy nature and thrifty qualities. Some millions of forest trees are annually raised here and distributed to all parts of the country. The Nurseries are within a few minutes' walk of Forres railway station, and any arborist who can pay them a visit will be amply rewarded for the trouble.

* *

It is gratifying to learn that an effort is to be made to preserve the celebrated cedars of Lebanon. An Austrian paper says that the famous cedar forest, which was formerly so extensive, has dwindled down to the dimensions of a mere thicket, numbering about 400 trees. The Governor-General of the Lebanon has now issued a special ordinance, containing a series of stringent regulations calculated to check, if not quite to put a stop to, the vandalism and carelessness of most travellers.

* *

The good citizens of Manchester appear to be much disturbed in their minds as to the failure of the experiment of planting young trees in their churchyards and other open spaces, and certainly when we learn that of 578 trees which have been planted since March, 1879, 203 are now dead, we certainly cannot congratulate them on the result. The trees selected for planting were the ash, poplar, thorn, willow, and lime, and the report states that the common ash, Ontario poplar, and the plum-leaved thorn have been found to thrive the best. The last two winters were, it is well known, exceptionally trying for all newly-planted trees, and it is very probable that this inclemency of weather, more than the smoky atmosphere, has been the cause of the death of such a large proportion of the trees. We hope, therefore, that the Town Council will not be discouraged, but will continue their useful experiments, and if care is taken to plant only those trees which are found able to withstand the

smoke, they will, we have no doubt, be able to show as good results as can now be seen in some other equally smoky towns.

* *

The general cultivation of fruit trees has never been practised by the rural population in this country, with the same intelligence and industry which we see so common in fruit-growing countries on the Continent, where neither soil nor climate are in any way superior to our own. Throughout most of central Europe fruit trees are planted by the farmers and cottagers with judicious care and discrimination in their fields and gardens. In an ordinary season they gather abundance of luscious fruit, not only enough to supply their domestic wants, but also to send large quantities to market, from which they realize an acceptable addition to their income. This is all done without losing a square yard of ground that could be profitably devoted to any other food crop. The trees are planted along roadsides, on the margins of the fields, in the hedgerows, and in other odd places and corners, where they occupy ground that cannot be conveniently or profitably cultivated.

* *

How much of this same nature of ground is allowed to run to waste in this country, it is difficult to guess; but it is safe to say that there is much more than sufficient to supply our rural population with abundance of fruit for all their home wants, and leave a large margin for sale at the nearest market town. Except in orchard districts, it is rare to see a fruit tree beyond the precincts of a garden, and in some parts even the gardens of the farmers and cottagers are utterly devoid of anything in the shape of a healthy fruit tree. A few stunted and scraggy currant and gooseberry bushes, with perhaps a strawberry bed overrun with

rank weeds, comprise the full extent of fruit cultivation practised by the ignorant or careless occupiers. Tree planting, either for fruit or timber, is naturally the landowner's business, and it is to the owners of the land that we must look for a decided improvement in the extension of fruit tree planting, wherever soil and exposure will permit of it, throughout the length and breadth of the land.

* *

Every road might easily become an avenue of fruit trees, and every hedgerow and ditch side dotted with them. There is no need to form orchards where the land can be profitably devoted to raising grain and root crops. Scarcely any land that will grow good hedges, but will also grow some kinds of fruit—apples, pears, plums, or cherries—and the cost for trees when bought in quantity, is no more than what is paid for forest trees trained for avenue and hedgerow planting. By a judicious selection of hardy, vigorous-growing and free-bearing sorts, there is scarcely an arable farm in the country, that it would not pay the owner or occupier handsomely to plant the boundaries of the fields with fruit trees. Indeed, for ornamental planting few trees are equal in habit to many of the varieties of the apple, and for the abundance and beauty of their blossoms in spring, and the rich crimson and gold of their fruit in the autumn, they have no equal. Introduced into shrubberies and pleasure grounds, they are always effective and welcome, and the planter ought to use them freely in all ornamental plantations. In this manner our supply of fruit may be enormously increased at little cost, and without curtailing the area devoted to the growth of other food crops.

* *

One of the most beautiful of hardy ornamental trees, but which is not

commonly seen outside of gardens and pleasure grounds, although it was introduced more than three centuries ago, is the Oriental plane, *Platanus orientalis*. It forms a fine stately tree, reaching to a height of 70 ft. or more, with a wide-spreading head and graceful foliage, which assumes in autumn the liveliest shades of brown and yellow. It prefers a deep loam, but will thrive in almost any soil but stiff clay, provided it is not sour or waterlogged. For massive foliage and elegance of outline it compares favourably with any of our deciduous trees, and for single specimens in parks or ornamental plantations it is superior to either the lime, beech, or sycamore. It is much better adapted for this purpose than for a town tree, for which its near relative, the Western plane, *Platanus occidentalis*, is so well suited. The last is generally a short-lived tree in this country, and is much more fastidious as to soil and exposure. It is one of our very best town trees, and thrives remarkably well in the atmosphere of our smokiest cities, but for general planting in the open country the Oriental plane is much preferable.

* *

One of the best known and esteemed of London nurserymen, Mr. Charles Lee, passed away at the ripe age of 73, on September 2nd. The deceased gentleman had for over fifty years been connected with the world-renowned Hammersmith nursery, and was well known as an excellent man of business, and a good judge of ornamental trees and shrubs.

* *

The photographs taken by Mr. Lawson, photographer, Forres, form a pleasant souvenir of the late successful visit of the Scottish Arboricultural Society to that district. The members, in one large group, were taken on the first day in the midst of a glorious bit of scenery on the banks

of the Findhorn, and also on the second day just within the entrance gates of Darnaway Castle. Many well-known faces stand out prominently in both these pictures and they cannot fail to recall pleasant reminiscences of a very enjoyable and instructive excursion.

* *

For richness of clear yellow colour in autumn few trees equal the American yellow chestnut, or buck-eye, *Pavia flava*. The tree is of more compact habit than the common horse-chestnut, and in a dry soil and warm situation it thrives well and flowers abundantly in this country. Towards the middle of autumn the foliage assumes the most beautiful pale yellow tints, and forms a charming contrast in pleasure grounds with the dark green of conifers and other trees. Combined with the scarlet oak, *Quercus coccinea*, the effect is both picturesque and interesting. These two trees are invaluable for autumn effect, and should be largely employed for that purpose by the landscape planter.

* *

As will be observed from Mr. Scott's letter on another page, the old ash at Earlsmill, which was one of the points of attraction on the occasion of the Scottish Arboricultural Society's recent visit to Darnaway, narrowly escaped destruction by fire on the 14th ult. We must congratulate Mr. Scott on his judicious efforts to extinguish the fire, which succeeded in confining it to the hollow bole.

* *

Miss Ormerod is never idle in prosecuting her war against injurious insects. We have received from her during the month a copy of a circular which she has issued inviting notes on the prevention of insect injury for her next Report. Information as to the attacks of the turnip fly, whose ravages this year have been so serious, is particularly

requested, together with any methods for its destruction which have been successfully employed. We hope that our readers will assist Miss Ormerod as much as is in their power.

* *

A forest is hardly the description of property which might be expected to attract the attention of even the greediest speculators, but the Town Council of Rocca Spinaretti, a small Italian commune, seem to have considered an adjacent forest belonging to the town as an eligible piece of plunder; at all events, they are now undergoing various terms of imprisonment for the misappropriation of it.

* *

The beauty of the autumn tints on the foliage of trees, forms a highly attractive feature in our woodlands during the present season. Owing to the great heat of the summer, followed by the cold and dull weather of August, the growth of trees received an early check, and the leaves of many of them assumed the autumnal hue some weeks earlier than usual. These trees are fast becoming denuded of their foliage; and the fall of the leaf, generally, is likely to happen sooner this season than in the average of years. There is a marked absence of the brighter tints of scarlet and crimson, which are so conspicuous a feature in a dry and sunny autumn. Yellow and brown of various shades are the predominating colours; and even they appear to be much less bright than we are accustomed to observe them.

* *

The excessive rainfall of the early autumn has produced a tendency in many trees and shrubs to start into a second growth, which will have no chance of ripening, so as to be able to withstand the rigour of the winter, especially if it should prove to be as severe as those experienced during the past few years. Forest trees may not suffer much from a continuance of the cold and wet, as

most of them are of such a hardy nature as to be able to endure the vicissitudes of our climate with impunity, and to ripen their growth under the most adverse circumstances; but many of the less hardy ornamental trees and shrubs will be severely injured, if the winter suddenly overtakes them in their present green and unripe state. So far as valuable shrubs, and single trees of a moderate size are concerned, it might be worth while to cut off the second growth at once, which will disfigure the plant as little as possible, and to a great extent ensure the ripening of the first-formed growth of the season.

* *

The annual review of the Indian Forest Administration, by the Inspector-General of Indian Forests, Dr. Brandis, shows that an improvement has taken place in the surplus revenue of the forest department, in the year 1879-80, and that good progress is being made in other branches of the forest service. The surplus forest revenue had dwindled to about 14 lacs of rupees in 1878-79, but in the year 1879-80 it amounted to a little over 20 lacs. Of this surplus, the Presidency of Bengal is credited with nearly 16 lacs, while Madras figures with a deficiency of 15,478 rupees. In round numbers the surplus of 1879-80 may be said to be £205,000; a nice addition for the year to the Indian Exchequer, although what proportion it bears to the whole extent of land under the sway of the forest department, there is no ready means of ascertaining. With improved modes of working, and the experience which has been gained by the department, we may fairly anticipate a gradual rise in the amount of surplus forest revenue, until the vast resources of the Indian forests are fully developed, and add their due quota to the economical products and the finances of the country.

From our correspondent, Dr. J. I. Rothrock, of Philadelphia, U.S.A., we have received a Catalogue of the Trees and Shrubs, natives of, and introduced in, the Horticultural Gardens in Fairmont Park, Philadelphia. It gives a short popular description of each family of plants, taking them in alphabetical order, and each genera and species is described in the same simple manner. For the purpose of the scholar and botanist, the alphabetical arrangement is perhaps of little value, but to the great multitude, who know nothing of technical botany and its plethora of hard terms, such a list as that before us will prove both useful and attractive. A good index affords easy facilities for finding the description of any tree or shrub mentioned in the work; but this might be considerably improved by a separate list of the common names in alphabetical order. To all interested in trees and shrubs it will be found a useful companion, and all American tree planters should not fail to become possessed of it.

* *

From the report on the crops of Illinois, U.S.A., which has reached us, it appears that the yield of wheat this year in that famous grain-raising State, will scarcely exceed half the crop harvested last season. This has been caused by the unfavourable nature of the weather in the early part of the season, and severe insect attack. The quality of the wheat is also below the usual standard, although there is but little of a really inferior quality. Much of the autumn-sown wheat was so injured by the severity of the winter, that the farmers ploughed it up, and cropped it with Indian corn, which has also produced a crop below the average of seasons.

* *

It will be observed that we have commenced in this month's *Journal* a reproduction of Mons. A. des Cars' celebrated treatise on tree pruning.

This work has obtained a high position on the Continent as a standard handbook on this important branch of Forestry, and we believe that our practical readers will derive great advantages from its perusal. The translation has been skilfully made by Mr. C. S. Sargent, Professor of Arboriculture at Harvard University, to whose courtesy we are greatly indebted for permission to take copies from the blocks, with which the book is copiously illustrated.

* *

From an interesting statistical return, showing the relative position and aggregate importance of the Australasian Colonies at the close of the year 1879, published at Sydney, and which has just reached us, we observe that these enterprising colonies are making good progress in everything which tends to raise a nation into prominence, and to elevate the social life of its inhabitants. The vast territory of Australia and Tasmania, extending to about 2,580,282 square miles, has still only 2,659,779 inhabitants, or about one to the square mile, and affords one of the finest fields for emigration to which our farmers and labourers can turn their attention in these hard times, when

farming in this country is in such a depressed condition.

* *

The New South Wales Court formed a centre of much attraction to the multitudes of visitors from all countries who inspected the Melbourne International Exhibition during the past season. Among the many rich and choice productions exhibited by various countries, the Australian colonies appear to have more than held their own. In a list before us of the articles exhibited from New South Wales, the vast natural products of the country appear to have been thoroughly exemplified, either in a natural or manufactured state. The forest products seem to have had great justice done to them, no less than 277 specimens of the woods indigenous to the colony being exhibited, under the authority of the Department of Mines. This numerous collection contains examples of every known indigenous timber tree in the colony, and must have entailed a heavy amount of labour and care on the part of Mr. Moore, the eminent Director of the Sydney Botanic Gardens, to whom fell the duty of collecting, preparing, and arranging this valuable and comprehensive collection.

—:O:—

FUNGI RAISING HEAVY WEIGHTS.

SOME years ago the town of Basingstoke was paved, and not many months afterwards the pavement was observed to exhibit an unevenness which could not easily be accounted for. In a short time afterwards the mystery was explained, for some of the heaviest stones were completely lifted out of their beds by the growth of large toadstools beneath them. One of these stones measured twenty-two inches by twenty-one, and weighed eighty-three pounds, and the resistance afforded by the mortar which held it in its place would probably be even a greater obstacle than the weight. It became necessary to repave the whole town in consequence of this remarkable disturbance. A similar incident came under our own notice of a large kitchen hearthstone which was forced up from its bed by an undergrowing fungus, and had to be relaid two or three times, until at last it reposed in peace, the old bed having been removed to the depth of six inches, and a new foundation laid.—*Land and Water.*



RED-TWIGGED LIME.

SIR,—I would be glad to know if you or any of your correspondents can give information as to whether the fluted lime, of which there is a magnificent avenue here, is a distinct species; whether it is rightly called the red lime; if it is a rare tree; and how it would be best propagated, whether by seed or suckers. The following is the dimension of the largest tree in the avenue, but the others are all much about the same size.

ft. in.			
15	10	at	1 ft. from ground (circumference)
12	10	at	5 ft. " "
9	10	at	33 ft. " "
5	9	at	47 ft. " "
92			height.

MIDDLETON.

Birdsall House, York, Sept. 1.

[The "Red-twiggèd Lime" is merely a variety, but a very distinct one, of the common European lime, *Tilia Europæa*. It is the *T. E. rubra*, of Sibthorp and Loudon, and the *T. E. corallina*, and *sanguinea*, of horticulture. As the tree attains maturity the stem gradually assumes the fluted form, which is probably more developed in the red-twiggèd lime than in any other variety of the species. Vigorous trees of this variety invariably assume the fluted stem as they reach maturity. Other varieties are seldom fluted to the same extent, and are more often cylindrical in the stem. The red-twiggèd variety is now much used in ornamental planting, being a favourite tree with the landscape gardener; but such a magnificent avenue as that at Birdsall is rarely to be seen, and even single specimens of their size are not common.

The best method to propagate it is by *layers*. Any of the lower branches

which have reached the ground, or can be readily brought down to it, will form excellent layers, and good plants will be produced from them in two years. If specimens are wanted for avenues or ornamental planting, the layers must be lifted at the end of the first year, and removed to the home nursery, where they can be trained into fine shapely plants, before being planted in their permanent sites, when they have attained a height of 8 to 10 ft., with straight clean stems and well-furnished heads.—ED.]

THE INDIAN FOREST DEPARTMENT.

SIR,—Permit me to thank Colonel G. F. Pearson for his letter that appeared in your *Journal* for August. I must confess, however, that I am by no means satisfied with his explanation. Theoretically *perhaps* he may be right, but under existing circumstances I think I can prove that he is practically wrong, and that the argument he has adduced rather tends to weaken than strengthen the cause he defends. Without launching out into a disquisition on forestry, I maintain that it is the duty of the Forest Department in India to adopt measures whereby the indigenous wood can be put in the market at a sufficiently reasonable price to obviate the necessity of importations of timber from other countries, which must naturally have an injurious effect on the revenue, and cause general dissatisfaction amongst timber merchants. There is no necessity to glut the market with timber, for this would imply selling at a sacrifice. The desired end, however, may be brought about by establishing sale depôts in different large centres of

trade, such as Calcutta, Bombay, Madras, Central Provinces, Burma, &c., where timber that has reached *maturity* should be transported (if no sale in the forest can be found), and sold by public auction, at periods regulated by the state of the market.

And now permit me to dissect Col. Pearson's letter, and see what his views are worth. In his second paragraph he opens out by telling us that "the first maxim which any forest school would teach, is that a natural forest represents so much capital in the shape of timber entrusted to the forester's care, as money is to the bankers," &c., &c. Are we to imply from this golden rule that bankers are in the habit of allowing their capital to remain idle? If not, may I ask why should foresters not turn their capital to account over and over again, as opportunity offers? or, in other words, why should *mature* timber not be sold at the earliest opportunity, and the land on which it stood turned again to account?

Further on, Col. Pearson proceeds to say: "A crop of timber differs from a crop of wheat, in that the ground is not cleared annually; but not the less does nature do in a forest the same work she does in a wheat-field," &c., &c. And he might have added, that the same law of economy governs both. No doubt he is perfectly correct; and the sooner the Forest Department in India arranges to fell and store *mature timber* (disposing of it at opportune times), and replant the area on which it stood, the sooner will the property entrusted to its care be improved and the revenue enhanced.

With reference to the following portion of Colonel Pearson's letter—"If I may be permitted to guess, they probably desired to cut down all the trees they required on payment of a certain royalty per cubic foot; but if this somewhat natural desire on their part were listened to,

forest conservancy would be at an end"—I shall feel grateful to any one who really does know something about forestry if he will explain why forest conservancy should come to an end simply because a contractor desires to purchase direct from the Forest Department, at a reasonable price, logs of *sál* timber that have reached maturity.

It is very good of Colonel Pearson having done his best to answer the question I put in your *Journal* for July last, but I fear, were I to accept his theory, it would be a case of the blind leading the blind.

ASTUTIA.

SURFACE DRAINAGE.

SIR,—Surface drainage, I assume, means thorough drainage. I question if even the most sanguine specialist would conceive the notion of draining elsewhere than the surface. It is therefore to dry the surface, not the centre, which man attempts while draining. Seeing that such is the case, the heading "Surface Drainage" is comprehensive enough.

In two of your more recent numbers Mr. Michie, forester, Oullen, contributed some well-directed remarks on this subject, but it appears to me that he indulged too elaborately in quotations from other writers, as the ancient Romans, for instance. What we want to know is, not what the Romans did, although knowing that as a matter of history does no harm, but what we should do to render our effort recuperative. No doubt the Romans accomplished some stupendous undertakings, but their rules are not applicable in our day. Although agreeing with Mr. Michie on the benefits resulting from a system of thorough drainage, I take exception to some of his remarks, not to refute anything he has written, but only to show how opinions differ. Our author says: "It is the nature of the climate that regulates the necessity for draining," and "had our climate been like that of Italy no draining would be required." Now I main-

tain that no field will suffer injury from any quantity of rain falling on its surface from the clouds, and that the necessity for draining arises, not from the "nature of our climate," but from the nature of the soil. The necessity for draining arises from one of three causes, or jointly:—1st, where the subsoil is an adhesive induratable tilth, through which water cannot percolate; 2nd, where the field is flooded with water oozing out from the base of higher ground, or rising to the surface from springs beneath; 3rd, when there is an overflow of back water, which stagnates on the surface. There is somewhere in Mr. Michie's neighbourhood a district called "The Laigh o' Moray," said to be "ill to droon," which suggests the porosity of the soil; and that had our soil, not our climate, been different, we with our genial showers would not have to follow the practice of the Italians, and resort to irrigating.

Mr. Michie, page 251, speaks of raising the surface of the ground 3 ft. above water-level, and says, "this is the most practicable thing to do." With a cabbage garden of a few perches it might, but what about some hundreds of acres? Take some of our slob lands or large inches, I am bound to say they never would be drained if no other way was more practicable than raising the surface 3 ft. with earth.

Having had some experience in this sort of work under the Board of Works I may perhaps be allowed to refer to the drying of level flats. Where such ground has bounded the sides of sluggish streams, I have found canals most practicable; sometimes I have had to carry these open canals downward parallel with the stream over a mile. It is obvious to any one that every yard with the stream adds to the fall. The canal may be near the stream, or if the extent of ground to be drained be large two discharge canals may be necessary, and a con-

siderable distance from the river. To the main canals lesser ones may be opened, branching off at acute angles. Into these the entire system of thorough drainage is discharged by means of sub-mains, which with the minor drains all branch off at highly acute angles. The advantage of my open canals is, they act in time of floods as auxiliary rivers in which, having their sides equal, the current is more rapid, and keeps the water from lodging on the surface of the ground. The method I have described will enable the flattest piece of ground to be thoroughly drained. Draining into rivers, however level the ground may be, is simple enough when compared with slob land where the drainage is discharged into tidal water. This is a more difficult work to do properly. The use of canals cannot be dispensed with; they act as reservoirs to hold the drainage water until an ebb of the tide opens the floodgates. These floodgates are erected as sluices, which shut on the tide flowing, but as soon as it ebbs the pressure of fresh water behind opens the sluices and the canals empty themselves. Of course bulwarks strong and substantial must be erected to resist the action of the water and prevent it flowing over at high water. In all cases open canals are in my opinion more effective for draining low level flats than raising the surface of the ground.

D. S. SCOTT.

Ballinacourte, Tipperary.

INSECTS ATTACKING SCOTCH FIR.

SIR,—Seeing that you invite observations by experienced foresters and others, I wish to ask the favour of a corner in an early issue of the *Journal* regarding an insect I see attacking Scotch fir. It is not serious as yet, and only a few cases at present I have observed, but a short article written concerning the insect

might draw observations from some other quarters. I do not doubt but that an easy remedy might be applied, and effectually, only what I mean to say is, that during my past twenty years' experience I have not seen any case like it.

THOMAS DOW.

*West Idvies,
September 15, 1881.*

[If our correspondent will send us a specimen of the insect, we may be able to tell him the name of it, and then perhaps some of our readers may suggest a remedy.—Ed.]

VAGARIES OF THE FERN TRIBE.

SIR,—In your last issue appeared a letter upon "Vagaries of the Fern Tribe and Poplars," by "A Desultory Forester," in which he states that "his ferns came up well in the month of May, but, lo and behold! when June came, they halted and declined to proceed any further, in spite of watering and manuring."

Perhaps your correspondent is unaware of the fact that ferns are not benefited by manure, either applied to the roots or by watering, and I can quite understand his next statement, that "in July they turned rusty, and some of them died back to the root."

It is also very injurious to remove the old fronds until the new ones are pretty far advanced, and in the case of your correspondent a week, as he mentions, was much too soon.

ANGUS D. WEBSTER.

*Penrhyn, Bangor, North Wales,
September 14, 1881.*

THE OLD ASH AT EARLSMILL, DARNAWAY.

SIR,—Many of your readers will no doubt learn with regret that the fine old ash tree at Earlsmill, on this estate, was set on fire—by some party as yet unknown—on the night of the

4th inst.; and special regret will be felt by those who saw it on the occasion of the Scottish Arboricultural Society's visit to this place in August last.

The interior of the bole of the tree for some distance up is very much hollowed out, and at the foot of it, on the south side, there is a hole by which access to the interior can be had. On the inside of the strong shell which yet remains, there was a considerable thickness of decayed wood, and also some accumulation of the same in the lower part of the cavity, all of which was as dry as tinder and in a fit state for ignition. Before the fire was observed it had got a good hold of the decayed wood referred to on the sides and at the bottom of the cavity, and although a large quantity of water was thrown into it, it seemed to have little effect. The night being dark, and it being found impossible to reach the fire above the hole with the appliances at hand, it was resolved to stop up the hole and all other openings through which (by the aid of a light) smoke was seen escaping, and by that means, if not to altogether extinguish the fire, at least to destroy its power very considerably until proper appliances were got to reach it. Fortunately the stoppage of all air passages had to a great extent the desired effect, so that when afterwards opened any smouldering fire was speedily extinguished by means of a hose and force-pump, and the use of Dick's patent "Extincteur." I am glad to say that, with the exception of the young root shoot referred to in your report of the Society's excursion, page 312, the tree has suffered little or no injury; the root shoot, however, from its position at the side of the hole where the fire originated, seems to have suffered considerably from the heat.

I must apologize to your readers for not being somewhat better posted up with a few facts regarding

this tree. Fifty-one years ago Sir Thomas Dick Lauder states that it girthed about 17 ft. at three feet from the ground. A number of years afterwards a large quantity of refuse soil and stones was carted in around it, so that the bole was covered up to a distance of from 4 to 5 ft. nearly all round and to at least 3 ft. in the lowest part, so that the place at which he (Sir Thomas) girthed the tree, instead of being 3 ft. above the ground level, is now about two feet under same, and the circumference of 20 ft. 6 in., now taken at one foot, is actually from 5 to 6 ft. above the original ground level,—clearly showing the progress the tree has made during the last fifty years. The tree has certainly not suffered from being so much buried up, but on the contrary seems to have been benefited by it, as many fresh roots are to be found at no great distance from the present ground level, and I think this to a great extent must account for the very marked progress it has made during the last 15 or 20 years—in which time the head and foliage have considerably increased.

Your readers will better form some idea of the circumference and dimensions of this ash, from the fact that the other day eight men stood with perfect ease alongside each other within the cavity at the base of the trunk.

D. SCOTT.

*Darnaway, N.B.,
Sept. 22, 1881.*

INFLUENCE OF THE MOON ON THE RISE AND FALL OF SAP.

SIR,—You will not, I trust, be offended at my saying your *Journal* is worthy of a better index, especially when I add that I have taken in, carefully studied, and appreciated it since its first appearance.

My quarrel with the last index is

this:—Some months ago I fancy I read in one of your articles allusions to a belief that trees cut during certain states of the moon shot freely from the stools, while those cut at other times die—in other words that the rise and fall of the sap is governed or influenced by the increasing or waning of the moon. I have hunted in vain for this article, and I can find no reference to it under such heads as “Coppice,” “Moon,” “Sap,” &c., while in the index I do find items under “How to,” &c., and “Is the,” &c.

Doubtless the allusions I require are buried in some article on other subjects, and I shall find them by perseverance.

I am a hard-worked Indian official, and devote my leisure to the duties of Honorary Secretary of the Madras Agri-Horticultural Society, and to forestry on a fairly large scale as an investment. Hence the ebb and flow of sap in trees is a subject of some importance to me; and, as some such belief as that to which I refer above exists amongst my native woodmen, it is possible there is something in it. If you or some of your correspondents can throw some more light on the subject you will confer a great favour on me.

The questions I put are simply, To grow coppice to perfection, should cutting take place during the rise or fall of the sap? How often does the sap rise and fall? Have the waxing and waning of the moon anything to do with the motions of the sap, or growth of trees?

JOSEPH STEAVENSON.

Madras, August 10, 1881.

P.S.—Since writing the above I have found the article of which I was in quest, and find that it does not refer to coppice, but to the quality of the timber. It is at page 639, vol. iv. J. S.

[See also Mr. Hutchinson's interesting remarks on this subject at page 441, vol. iv. Coppice intended

to shoot again should not be cut when it shows a tendency to "bleed," as the excessive loss of sap exhausts the stools and renders them barren. We will be glad to have the opinion of our correspondents upon the subject of the influence of the moon on the rise and fall of sap in trees.—ED.]

CATERPILLARS.

SIR,—My forester will forward you herewith a few specimens of a caterpillar which abounds on this property, to the extent of constituting a veritable plague. I noticed its appearance for the first time last year, but the present season has brought an enormous accession to its numbers. It attacks the beech principally, large branches on some old trees in the park having been entirely stripped of their leaves by it, and young transplants standing as bare as herring-bones; but it is also to be found on the ash, lime, and other deciduous trees. (Some young lime-trees in East Meon churchyard, hard by, have been completely cleared of their foliage by its agency, and present all the appearance of winter.) I should be glad to know whether a similar phenomenon has been presented elsewhere, as I think it would be in the interest of arboriculture generally to ascertain the fact. I may remark that the trees

which were stripped this time last year do not appear to have suffered in consequence this season, which is what my experience would lead me to expect, leaves ceasing to be necessary to the tree as soon as the mid-summer growth has been completed.

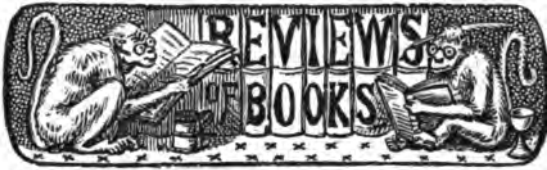
J. D. LEWIS.

Westbury House, Petersfield,
Hants.

[The insects referred to by our correspondent are the caterpillar of the Buff-tip Moth (*Pygaera bucephala*), which feeds on the leaves of many of our broad-leaved deciduous trees. The oak, lime, beech, elm, alder, birch, and others, are attacked by it, and often much injured, when the attack is so severe as in the present case. The caterpillars are easily shaken off the trees, and where such means of getting rid of them can be adopted a man with a number of boys could be profitably employed to go round and shake the caterpillars from off the trees, and kill them as they reached the ground, by stamping on them with the feet. Young trees, the tops of which can be reached from the ground, may be readily hand-picked. For other methods of getting rid of this caterpillar our correspondent should consult the recently published "Manual of Injurious Insects," by Miss E. A. Ormerod.—ED.]

ENGLISH BOULEVARDS.

It is pleasant to find so much interest taken in the planting of trees at seaside towns. Clacton-on-Sea, one of the latest aspirants to the favours of London holiday-makers, will one of these days be a veritable *ville-en-bois*, miles of streets and roads having been laid out on both sides with beautiful young trees, which are making such progress that you can almost see them grow. Several inland towns are also remarkable for their tree-planted streets and promenades. Shrewsbury and Grantham are capital instances in point. Most of the trees at Grantham were put down by public subscription about fifteen years since, and they are now a credit and delight to the place, the notice-boards attached to the guards round them, in which "the public are requested to protect the property belonging to the public," having been effective. Some of the newer streets and roads in the Essex town of Romford are about to receive similar decoration.—Land.



A Week's Holiday in the Forest of Dean.

This small book, published by Mr. John Bellows, of Gloucester, contains a narrative of walks taken by the writer on several consecutive days in the Forest of Dean; the object being to make tourists acquainted with a district—almost unknown—abounding with beauty and interest. Six or more coloured views, several wood-cuts, and a map accompany the book. With an opening chapter giving the history of the Forest of Dean, the writer gives a description of each locality and the surrounding neighbourhoods passed, commencing with Gloucester as the starting point, thence by Sharpness, the Severn bridge, Gatcombe, Sydney, the Speech House, to Holly Wood and the High Beeches.—“Refreshed by sound, unbroken sleep,” he says, “we rise and look straight away northwards over miles of sylvan glory, nearly 600 feet above the sea. Beneath us lies the Holly Wood; around, beyond, a very sea of rolling Forest.” . . . “On our right hand stand the five High Beeches; noble trees, which, growing on high ground with no other large timber near them, can be distinguished from a great distance.” Further on the writer says, “Among the walks that tempt one in the cool of the evening, the Spruce Ride claims special mention. It is a grass road, some thirty feet wide, running in a straight line of two miles, over dell and hill, between an avenue of black spruce trees.” The author, referring to another pleasant trip which may be made from the Speech House, says: “The view over the vast area of

wood, which we get from the railway near Serridge Junction, is very grand. On the left we catch sight of an oak, called by some people ‘the king of the forest,’ or ‘the crad oak.’ Some distance beyond this tree, we see ‘Jack of the Yat,’ said to be the oldest oak in the forest. An enclosure called the ‘Nag’s Head’ has some half a million oaks in it, and there are some splendid old trees near Park-end, in the neighbourhood of York Lodge.” The book abounds in historical descriptions of interesting places visited, Tintern Abbey, Raglan Castle, and Flaxley Abbey, being among the number. A cheaper and more interesting guide to the Forest of Dean has not been published.

The September part of the *Florist and Pomologist* contains two plates, fairly well executed in colours—a group of *New French Pelargoniums* and samples of the Belgian Pear, *Des deux Sœurs*. An article on “The Peculiarities of Grapes;” another on “Early Peas;” a report on the Metropolitan Rose Show; and continuations of three articles now running in the magazine, “Vines and Vine Culture,” “Culture of Wall Flowers,” and “Elements of Orchard Culture,” help to form the general contents.

OUR FOREIGN EXCHANGES.

IN the Italian *Nuova Revista Forestale* appears a translation by Senor V. Benyoni of the paper on the pruning of forest trees, published in the *Journal of Forestry* of March, 1881; and a paper on the forests of Russia. From this it appears

that the forests of Russia in Europe cover an area of 214,000,000 of hectares, equal to an area exceeding that of France, Germany, Austria, Italy, and England combined, and amounting to 40 per cent. of the area of European Russia, while the proportions in other countries are : in Norway, 30 per cent. ; in Sweden, 35·4 per cent. ; in Austria, 27·1 per cent. ; in Prussia, 21·9 per cent. ; in France, 16·2 per cent. ; in Italy, 15·2 per cent., and in England 7·6 per cent. In regard to population there are 298·74 hectares of forest land for every hundred of the inhabitants.

But these forest riches are very unequally distributed ; Finland and the north-east of Russia possess 68·5 per cent. of the whole.

According to official data the exports of wood from Russia, exclusive of the Grand Duchy of Finland, amounted in value—

In 1867 to	12,017,508	roubles.
1868	13,914,439	"
1869	10,082,225	"
1870	14,421,752	"
1871	15,560,866	"
1872	24,272,736	"
1873	32,352,971	"
1874	36,320,268	"
1875	29,244,463	"
1876	33,318,071	"

The value of exports in 1876 to different countries was as follows :

—To England, 15,788,535 rs. ; Prussia, including expenses of transport, 10,912,106 rs. ; Holland, 2,676,167 rs. ; France, 1,193,054 rs. ; Germany, exclusive of Prussia, 1,018,934 rs. ; Belgium, 481,212 rs. ; Denmark, 362,052 rs. ; Norway and Sweden, 280,272 rs. ; Finland, 159,673 rs. ; Austria, 148,758 rs. ; Turkey, 98,757 rs. ; Portugal, 97,606 rs. ; various countries not specified, 46,591 rs. ; Persia, 31,263 rs. ; Italy, 30,736 rs. ; Roumania, 28,789 rs. ; United States of America, 10,096 rs. ; Spain, 2,000 rs. ; Greece, 1,500 rs.*

* The rouble at present is equal to 2s. 1½d., but the value varies from 2s. to 3s.

The total value of annual exports of forest products from Russia, according to the *Centralforstblatt* of Vienna, exceeds 21,750,000 florins, say £2,175,000.

In the same number is given a notice of the application in Bombay of the invention by Dr. Robertson, of New York, for cutting down standing trees by means of a platinum wire heated to redness by an electric current, which saves time and material. The tree is by this means cut through to one-fifth of its diameter, and the work is completed in the usual way. It is said to be accomplished in one-eighth of the time required by axe or saw, and with very little waste. The drawback is that, after being used a few times, the wire becomes easily broken, or is otherwise so deteriorated as to be unserviceable.

In the *Revista de Montes* is given the text of a Government order by the *Minister de Fomento* relative to the conservation, exploitation, and amelioration of the condition of the forests of the State in Spain, and a detailed report in regard to *repoblacions* or renovation of State forests in the district of Alicante. (Like reports in regard to like work in several other provinces were given in preceding numbers.)

In the *St. Petersburger Zeitung* appears a valuable paper on the renovation of existing forests, and a paper taken from the *Oest. Ldw. Wochenbl.*, on the means of destroying the *Phylloxera* and other *Blattläuse*, or *Aphides*. In the latter it is stated that in the *Königlichen Lehranstalt für Obst-und Weinbau*, at Geisenheim on the Rhine, within the last two years experiments have been tried with many substances for the destruction of *Aphides* : some of them killed the insect, but also killed the plant ; more especially was this the case with the apple trees, which were injured and burned up ; others did no damage to the plants, but neither

did they do any to the insects, or did but little to them. The most satisfactory results followed a single application which Dr. Nesler, of Karlsruhe, had devised and used successfully against the *Sauervürms*. There are taken 40 gr. of soft soap, 50 gr. of fusel oil, 60 gr. of extract of tobacco, and 2 decilitres of spirits of wine in one litre of rain or river water. The soft soap must be rubbed down on the inner side of a tumbler, and this then filled with water and allowed to stand. The soap dissolves, and is slowly diffused or precipitated, and this is mixed with the other materials diluted with the remainder of the water. An infusion of tobacco, or common tobacco liquor, may be substituted for the extract of tobacco, 30 gr. of tobacco leaf or of tobacco dust, as it may be obtained from a tobacco manufactory, being infused in boiling water. The grounds may be kept out by passing it through a linen or cotton sieve, or, still better, filtering paper, when mixed with the other ingredients and diluted with the water. The cost is about 50 pfennings, or sixpence per litre. Persian insect powder is much more expensive, and it may be applied with little loss by means of a pitcher with a long spout like that used in oiling machinery. It may be applied to leaf or twig without injury to them. The insects die and drop off, and the first shower washes away all that remain.

A congress meets in October at Bordeaux to consider the damage being done to the vine by the *Phylloxera* and the best means of arresting the evil.

From Venice we have received copies of *La Venezia*, *L'Imparziale*, and *L'Adriatico Gazzetta del Veneto*, giving details of the proceedings at the Geographical Congress in Venice. The opening meeting was held in the Ducal Palace. Graphic descriptions are given of the pageant, of the appearance of the King and Queen of Italy, who attended, of dignitaries of

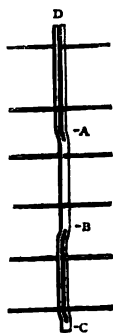
the Church and decorated officials, of naval and military officers in rich uniforms.

Il Congresso was greatly popular, and the gay Venetians entertained the members with operas, concerts, boat races, and illuminations; some of the latter were magnificent. The *grand spectacle* was the electric light, something new in Venice, and an open-air concert on the Piazza St. Mark. Thousands of Italians had flocked to Venice to witness the fêtes. Great interest has been taken in the Geographical Exhibition, and special mention is made by correspondents of raised maps, and of photographs from all parts of the world.

JOHN C. BROWN.

A GOOD DROPPER FOR WIRE FENCES.

THE accompanying illustration is a sketch of a dropper, the invention of Mr. J. G. Thomson, Wood manager, Grantown, Strathspay, which has been found to answer remarkably well for sheep fences.



The dropper consists of a strip of hoop-iron, about 3 ft. in length, and 1½ in. wide, with three slits about 1 in. long made in it lengthwise, at A B C, at which points the dropper is slightly curved. A strong wire (D) is then passed down the face of the dropper, and passed through the hole at A to the back, passing through to the front again at B, and finishing off at the back at C. There are six slits made alternately on each side of the dropper, to receive the fence wires; when they are thus inserted, and the dropper wire threaded through the holes from back to front, the whole is perfectly tight and firm, and neither sheep nor cattle can remove the wires from their hold. This dropper has the advantage of

being very light, and not catching the wind on high and exposed places, and it can be put on without taking down the fence or loosening the wires. We are informed that this dropper has been employed on the Earl of Seafield's Strathspey estates, for the last nine years, with marked success, and that it can be manufactured at a price which makes it one of the cheapest droppers in the market, while it is undoubtedly one of the simplest and best.

ON THE IMPORTANT GEOGRAPHICAL EFFECTS OF THE DISFORESTING OF MOUNTAINS.*

WHILE I was residing in the Colony of the Cape of Good Hope I had opportunities of observing the effects produced by the destruction of forests on South Africa, and of hearing from others, credible witnesses free from prejudice, statements of facts witnessed by them. I shall confine myself to statements of fact, avoiding argumentation; but as my statements may take a colouring from the views which I hold on the general subject, I may state that I consider:—(1) The production of primeval forests may have been greatly influenced by climatal conditions, including the rainfall in the locality; (2) Forests once produced may possibly have increased the rainfall by occasioning the repeated evaporation and deposit of the same water; (3) Irrespective of this, though to a greater extent in consequence of this, the existence of the forests secured a pretty equal diffusion of the rainfall in the locality both in space and in time; (4) The destruction of forests probably, in view of what has been stated, somewhat diminished the quantity of the rainfall; but whether it did so or no, it was followed by the rainfall becoming

irregular both in its range of time and locality, raining here and there in torrents, while elsewhere it was dry—and had been so long—and after months or years of drought deluging that or some other spot, while all around was dry; (5) and as a consequence of this converting extensively, and for long periods, river-beds into dry watercourses, filled at times from bank to bank with torrents rushing headlong to the sea.

Of consequent results I do not consider it within the scope of my subject to write.

II. South Africa has an arid climate, and an arid soil; but years of drought are occasionally followed by destructive inundations. The geological formation, the physical geography, and forest clumps in the interior tell that it was otherwise in bygone times. The first mentioned does so by the alluvial and lacustrine deposits; the contour of the country tells of extensive denudation by aquatic currents; and there are in the interior clumps of *Adansonia digitata*, and also of other trees, which appear to be the produce of seeds which germinated when the localities in which they grow were a little, and only a little, above the level of adjacent water. I have published some details in regard to these, and may advert here to the following circumstances indicative of their bearing upon the matter in hand. The clumps are generally on rising grounds, in the middle or on the sides of what appear to have been water-basins; the trees in each clump are apparently of one age, but different clumps are apparently of different ages, and in some cases those of greatest altitude above the sea level are of greatest age, an illustration of which is supplied by Mopane trees, apparently a species of *Bauhinia*, in the Shua valley, in the district of the Limpopo. By the deceased Mr. James Chapman, a man careful in his observations, I

* Communication by Rev. Dr. J. C. Brown to the Geographical Congress held last month in Venice.

was informed: "The Mopane trees are small in the lower portion of the Shua valley"—which is the part which I presume would be longest under water—"but they are longer and stronger the higher that valley is ascended"—in proportion, that is, according to my assumption, as the soil has been longer free from the covering of water—"and very much larger in the vicinity of the river Naté, which comes in a direction from the town of Moselekatsi, where they have attained a considerable magnitude"—which I attribute to that part having emerged from a waste of waters at a much earlier period, while waters covered to a considerable depth the lower-lying lands.

III. In whatever way and at whatever time forests may have been produced in South Africa, there are indications that the land was at one time much more extensively covered with forests than it is now; and evidence that forests once existed there which have in some cases been cleared away and in others greatly reduced in extent. To South Africa, in the region of Natal, was given by Vasco de Gama, in 1495, the name of *Terra de Fume*, and the extensive burning of bush, herbage, and grass, the smoke arising from which procured for it that designation, has been continued on to the present time, apparently, both by native tribes and by European colonists throughout a period of well-nigh 400 years, and probably from times long anterior to the time of that discoverer. Not only have Dr. Moffat, Dr. Cassilis, Dr. Livingstone, and others, conjectured, from what may be seen going on in the present day, that this long-continued practice of burning off the dry or hard products of vegetation must have had the effect of destroying many trees, but some of them have told of stumps and other remains of burnt trees seen by them; and to these I have referred as indications of the land having been at one time

much more extensively covered with forests than it is now. Moffat tells of "the accidental destruction of whole plains of the *Olea* wild olive by fire near Griquatown. There the stumps still remain, or at least were in existence some years ago, and I have never heard of their disappearance." To these I refer as evidence that forests once existed where now there are none. Moffat further testifies in regard to the Bechuanas, amongst whom he laboured, "that they are a nation of levellers . . . cutting down every species of timber without regard to scenery or economy. Houses are chiefly composed of small timber, and their fences of branches and shrubs. Thus, when they fix on a site for a town, their first consideration is to be as near a thicket as possible. The whole is presently levelled, leaving only a few trees, one on each great man's fold, to afford shelter from the heat, and under which the men work and recline." There are countries in Europe in which were this done, the forests might be reproduced by self-sown seed, but it is not so now in any part of Africa which I have visited; and Moffat tells that of whole forests where the giraffe and elephant were wont to seek their daily food nothing remains. "When the natives remove from that district, which may be after only a few years, the minor species of the *acacia* grows, but the *acacia giraffæa* requires an age to become a tree, and many ages must pass before they attain the dimensions of their predecessors. In the course of my journeys I have met with trunks of enormous size, which, if the time were calculated necessary for their growth, as well as their decay, one may be led to conclude that they sprung up immediately after the flood, if not before it."

The European colonists have done as the native tribes did before them, and by burning the grass, and reckless felling of trees, forests have been reduced in extent or altogether

cleared away. The mode of exploitation is that known in France as *Jardinage*: for a small fee a licence to cut and bring out of the forest a waggon-load of some specified timber is given, and the licence-holder helps himself. Thus forests of the copse cedar, *Widderringtonia juniperoides*, which gives their name to the *cedar-bergen* of Clanwilliam, the whole of which chain of mountains was added with these trees, have now almost entirely disappeared. It is only the great extent of the forests of George of the Kingsana and of Kaffraria which has prevented these forests from yet attaining a like condition. And a mountain adjacent to Somerset, it has been reported to me, is entirely cleared. Bush fires have aided in bringing about this result. I have seen in the Colony, mountain-sides naked and bare, which some years before were covered with trees. What I have stated has been confirmed by many of my correspondents.

There has been reported to me details of a forest fire on 15th December, 1865, which was occasioned by four natives kindling a fire on the pasture land of Galger Bosche, and was so extensive, that the smoke extended to and beyond Bedford, a hundred miles distant; and on the 9th February, 1869, there occurred a like fire which desolated a tract of country 400 miles long, and varying in breadth from 15 to 150 miles.

IV. Consequently upon the destruction of forests there was extensive desiccation of soil and climate, alternations of long-continued drought with destructive floods, and indications that the sequence is that of cause and effect. Dr. Moffat tells of the arid region of his missionary labours, that in his settlement at Latakoo, the natives were wont to tell of the floods of ancient times, the incessant showers which clothed the very rocks with verdure, and the giant trees and forests which once studded the brows of the Ham-

hana hills and neighbouring plains. They boasted of the Kurruman and other rivers, with their impassable torrents in which the hippopotami played, while the lowing herds walked to their necks in grass, filling their *makutas* with milk, making every heart to sing for joy. Now all that is a thing of the past. I have visited a farm where it may be said they had had no rain for three years. I had once to ride eighty-four miles before I could reach a fountain where my horses could drink, and on another occasion I had to send my horses at mid-day six miles off the road to slake their thirst, while I and my companions rested. But towards the close of the year in which I left the Colony (1867) there occurred a flood, the damage occasioned by which to roads and to house property at Port Elizabeth alone was estimated at from £25,000 to £30,000. Within a year thereafter a similar destructive torrent occurred at Natal, in regard to which it was stated that the damage to public works alone was estimated at £50,000, while the loss to private persons was estimated variously from £50,000 to £100,000. Towards the close of 1874 still more disastrous effects were produced by torrential floods; according to the report given by one of the Colonial newspapers the damages done could not be estimated at much less than £300,000. According to the report given by another, the damage done to public works alone was estimated at £350,000—eight millions seven hundred and fifty thousand francs. In stating that there are indications that the sequence of these phenomena to the destruction of forests is the sequence of effect and cause, I refer not to what has been observed elsewhere, or to what has been ascertained in regard to the effect of trees in arresting the flow of the rainfall; but this I have been informed in many cases on the spot, that the felling of clumps of trees had been followed

within a very short time by the stoppage of fountains, the flow of which had previously been perennial. I have myself noticed on the ascent of a treeless hill, a stream six inches deep the whole breadth of the road within twenty minutes after the fall of rain had commenced; and by experiments made on Wynburg Hill, by Mr. Wm. Blore, M. L. A., Fellow of the Meteorological Society of London, and Secretary of the South African Meteorological Society, to test some statements I had made, it was found that the evaporation from a jar sunk in cleared ground was more than double that for a jar of the same diameter about 120 ft. distant, when it was partially shaded but not covered by bush: the former being in the same time 1'854 in., the latter '863 in., giving an excess of '991 in. The experiment was repeated with similar results. By another experiment it was ascertained that while the deposit of dew on a green surface amounted to 4'75, that on a white surface amounted only to 2, or less than half the quantity. He further ascertained that while the difference of temperature in the water in the two jars employed in the former experiment was only a few degrees, the difference of temperature between black ground and ground shaded by bush was about 25 deg. Fahr., which would occasion a vastly greater difference in the amount of evaporation than that which occurred in his experiment. In illustration of what is implied in the result of the experiment made by Mr. Blore, the excess of evaporation from the more exposed jar above that from the jar partially shaded but not covered, being an inch, more strictly, upwards of ninety-nine hundredths of an inch, of water, and more than double that of the latter, Mr. Blore remarks: 'An inch in six days (the time consumed in the experiment) will give for 102 days, the ordinary

duration of the hot, windy, and dry season in the district, 17 inches. This is equal to about three hundred and eighty-four thousand (384,000) gallons per acre, and supposing 1,000 acres to be burned, blackened, and dried, what with sunlight, fire heat, and wind the evaporation would be an excess of three hundred and eighty-four millions (384,000,000) of water above what would have been evaporated if the bush or grass had been left unburned.' And I add *a fortiori* if the forest had not been destroyed."

JOHN C. BROWN.

LESSONS OF THE HARVEST OF 1881.

THE following interesting letter was contributed to the *Times* of September 5th, by Mr. A. J. Burrows, whose writings on "Agricultural Depression" in this *Journal* have lately attracted much attention:—

"SIR,—The results of the still unfinished harvest, as far as they can at present be ascertained, are such as to cause the thoughtful farmer to return from his fields and sit, *Æneas-like, multa revolvens*, when he undertakes to count his losses and considers how he shall meet his ordinary payments out of the proceeds of another extraordinary season. A light crop of hay, small breadths of mangolds, but few swedes and very late turnips, and a short supply of straw, might have been endurable provided the quality of the latter had proved good and the corn uninjured. But in too many instances the wheat still remains in the stook, much of it grown, while the barley is discoloured and sprouted, and the oats are shedding upon the ground. Even the meagre crops of beans, which upon some of the heavy clays will not pay for seed and labour, may still be seen sparsely dotting the ridges which have been broadshared to clean the ground. But small as is the comfort to be derived from the present agri-

cultural outlook, there are lessons to be learnt from our misfortunes which we may do well to consider. In various districts and upon particular farms which are not exceptionally favoured either as regards climate, soil, or aspect, it may be noticed that year after year the crops are cut and garnered before adjoining lands have even begun to be cleared, and this mainly owing to early sowing. Upon most soils an early harvest is not the only advantage of early seeding. In many instances the weak and patchy appearances which corn fields present in the spring are attributable to late sowing, as a result of which the plants are assailed by the rigours of winter before they become established in the soil, or have obtained that strength of root and vigour of constitution which alone can fit them for the endurance of such a winter as that of 1880-1.

As a consequence of early sowing last autumn, we were enabled to cut at the beginning of August, and carry, stack, and thatch nearly the whole of the corn upon a large home farm here by the middle of the month, and thus to escape the dire calamities which have befallen so many of our neighbours. Clean grattens also gave us opportunities of carrying very shortly after the corn was cut; while the practice of insisting upon small sheaves and moderate-sized stooks favoured the rapid drying of a few acres of oats, which were exposed to the disastrous storm of the 25th August.

Hay-drying and corn-drying machines must for some years to come be luxuries out of the reach of the small farmer; but where the land is fairly drained, early sowing, clean cultivation, and small sheaves, well tied up and stooked, will enable him to secure his crops early and expeditiously, and consequently at little cost in ordinary seasons. Early sowing is often objected to on account of the crops getting too forward in the spring, and becoming lodged in the summer.

But one of the best preventives of this is thinner seeding and greater spaces between the drills, whereby the light acts upon the otherwise too succulent stems of the plants, which thus become effectually carbonized and thoroughly hardened, so that they will stand erect. By sowing a few hundredweight of salt per acre over the crop the same result may often be obtained, as the contained soda will act beneficially upon the silicate in the soil, and strengthen the straw. In the case of very strong wheat "flagging" may be resorted to with advantage.

Another method of lessening the evil of a late and wet harvest is the cultivation of more autumn-sown crops, such as winter beans, oats, and barley, and the growth of early peas, which may be put in soon after Christmas. Such crops may generally be cut and carried before the bulk of the wheat, barley, and oats is fit for the scythe. By this method, though the harvest may extend over a longer period, less corn will be exposed at any one time. The majority of the failures of autumn-sown crops may be attributed to late sowing, or to the loose state in which the land is left after early seeding.

A. J. BURROWS.

Pluckley, Kent, Sept. 5.

DESTRUCTION OF THE PINE FOREST OF RAVENNA.

WE learn with regret from an excellent article in the *Gardeners' Chronicle* that the celebrated pine forest, the charm and the pride and the glory of Ravenna, is a thing of the past. "The groves of stately pine trees that rose terrace above terrace for mile after mile along the shore of the Adriatic are no more. The ruthless frost that destroyed the orchards of France and Germany destroyed also the pines of Ravenna; and a forest so rich in memories of the past and associated with so much that is dear to artist and poet has

disappeared, or is marked only by lifeless, leafless trunks. This calamity—for such it is, as the noble pines were, if not a source of wealth, at least a source of sustenance to a considerable population—occurred in the winter of 1879-80, yet it has hardly got on record. It has, however, none the less been talked of and deplored. Indeed, all lovers of trees, apart from any sentimental associations, will regret the loss of the Ravennese, which in these days of travelling and reading is really the loss of the whole world. Although it is recorded that the Adriatic was frozen in places some two centuries ago, such an intense wave of cold as that which passed over that part of Europe in 1879-80 has not there been experienced within historic time. At least such may be assumed to be the case, for the pine forest seems to have grown up with the city, whose history is of the most venerable, and we read of no interruption in its glory. Whether the forest was originally planted by the hand of man or by Nature we cannot tell, but most likely the former, as the seeds of the pine forming it (*Pinus pinea*) are, and have been from time immemorial, a valuable article of food. In former times their importance was doubtless greater than at the present day. Yet the history of the great Pinetum is not unwritten, for we find the title of a book which we have not been able to consult. The extent of the forest is variously estimated by different writers. Thus, J. A. Symmonds, in his *Ravenna*, states that it stretched some forty-six miles along the coast, whereas in the more prosaic description of Murray's *Handbook of Northern Italy* the length is given as 25 miles. It extended from the Lamone River, north of Ravenna, to Cervia, on the south, occupying a sandy tract varying from one to three miles in breadth. The following description from Symmonds'

Ravenna is the best to which we have access:—

"As early as the sixth century the sea had already retreated to such a distance from Ravenna that orchards and gardens were cultivated on the spot where once the galleys of the Caesars rode at anchor. Groves of pines sprang up along the shore, and in their lofty tops music of the winds moved like the ghosts of waves and breakers plunging upon distant sands. This Pinetum stretches along the shore of the Adriatic for about forty miles, forming a belt of variable width between the great marsh and the tumbling sea. From a distance the bare stems and velvet crowns of the pine trees stand up like palms that cover an oasis on Arabian sands; but at a nearer view the trunks detach themselves from an inferior forest growth of juniper and thorn and ash and oak, the tall roofs of the stately firs shooting their breadth of sheltering greenery above the lower and less sturdy brushwood. It is hardly possible to imagine a more beautiful and impressive scene than that presented by these long alleys of imperial pines. They grow so thickly, one behind another, that we might compare them to the pipes of a great organ, or the pillars of a Gothic church, or the basaltic columns of the Giants' Causeway. Their tops are evergreen and laden with heavy cones, from which Ravenna draws considerable wealth. Scores of peasants are quartered on the outskirts of the forest, whose business it is to scale the pines and rob them of their fruit at certain seasons of the year. Afterwards they dry the fir-cones in the sun, until the nuts which they contain fall out. The empty husks are sold for firewood, and the kernels in their strong shells reserved for exportation. You may see the peasants, men, women and boys, sorting them by millions, drying and sifting them on the open spaces of the wood, and packing them in sacks to send abroad

through Italy. The *pinocchi* or kernels of the Stone Pine are largely used in cookery, and those of Ravenna are prized for their good quality and aromatic flavour. When roasted or pounded they taste like a softer and more mealy kind of almond. The task of gathering this harvest is not a little dangerous. They have to cut notches in the straight shafts, and having climbed often to the height of 80 ft., to lean upon the branches, and detach the fir-cones with a pole—and this for every tree. Some lives, they say, are yearly lost in the business."

But the pine forest of Ravenna, that was for so long, is now no more, and all the world is lamenting. The pine woods near Pisa and Florence, and in other parts of Tuscany, are very beautiful, perhaps equally beautiful, though not so extensive, as was the pine forest of Ravenna, and immeasurably less interesting.

IVY NOT HURTFUL TO TREES.

THE following observations on the effects of ivy on trees, written by Repton many years ago, and published in "The Transactions of the Linnean Society," appear to be so valuable and hitherto seen by so few, that we have thought it well to reproduce them. "Although I am afraid," says Repton, "that any attempt to remove the long-established prejudices concerning ivy will be deemed chimerical by those who have taken up a contrary opinion from theory to that which I deduce from facts and observation, yet I will venture to assert that ivy is not only less injurious to trees than it is generally deemed, but that it is often beneficial, and its growth deserves to be encouraged rather than checked, as is too often practised in woodland countries. I have been led to adopt this opinion during the last two or three years, from having observed the timber

in some very old parks and woods (as at Stoneleigh Abbey, Warwickshire, Langley, in Nottinghamshire, and some others), where the ivy had not been cut off, and where the timber was in greater perfection than at other places in the same neighbourhoods where the ivy had been most cautiously destroyed; and during the winter of 1808 and 1809, the contrast betwixt the scenery of different places with and without ivy was so striking, that I was insensibly led to collect facts in support of the opinion so diametrically opposite to the theory of those who consider ivy as a destroyer. In 'Miller's Dictionary,' by Martyn, ivy is said to waste and devour trees; and in Evelyn's 'Silva,' book ii., chap. vii., it is classed among things injurious to trees without any reason assigned, and is thus mentioned: 'Ivy is destroyed by digging up its roots and loosening its hold; but even the removal of ivy itself, if very old, and when it has long invested its support, is attended with pernicious consequences, the tree frequently dying from the sudden exposure to unaccustomed cold.' And I have found in the north of England that ivy is considered as a 'clothing to keep the tree warm.' Yet the poets of all ages have accused the ivy of feeding on the tree by which it is supported; although it is now very generally known that it draws its nourishment from the soil by roots, and not from those fibres which have been mistaken for roots, but which are in fact claspers by which it fastens its tendrils to the bark of trees, when the bark is of sufficient thickness; but it is a remarkable fact, that ivy will not lay hold of the shoots of any tree till the bark is three or four years old; and that it is more apt to attach itself to trees whose bark is decayed than to young and healthy shoots where the bark is thin and smooth. It very rarely happens that ivy climbs to the extremity of a young shoot,

and if it were capable of doing so, and of subduing the growth of young branches, it would more easily destroy the shoots of pollards cut down close into very large masses of ivy, as we often see by the sides of high roads; whereas, on the contrary, it will be found, that if there be any difference in the growth of such shoots, it will be in favour of those pollards that are most profusely covered with ivy.—*Garden.*

AN OLD IRISH OAK.

THE old veteran, to which the following verses refer, grew in County Antrim, in the Park of Lord Conway, near Lough Neagh, from which the timber was cleared away about the beginning of the present century, and not a sign or vestige of the park remains. This oak tree, called from its extraordinary size and dimensions the Royal Oak, was 42 ft. in circumference. The principal arm was sold for an axis of a mill, and the other branches built a vessel of fifty tons, which was distinguished by the same appellation as the parent tree. The bark of this tree sold for forty guineas, the trunk was sold at 1s. 6d. per foot, and the whole tree produced a total sum of from £100 to £150. This great tree, being decayed at the roots, sank under the pressure of time, about forty years ago, on a calm day.

THE ROYAL OAK.

With mountain weight the valley
groined,

When thou the debt of nature paid,
The naiad sighed, the dryad moaned,
The forest languished in the shade.

But we alone thy virtues see,
For whom thou lived; for whom
thou died.

In life, thou sheltered us, O tree;
In death, didst for our wants provide.

Hail, honoured subject of our rhyme,
Descending to thy parent ground;
Hail, yielding to the stroke of time,
With hoary age, and honour
crowned.

Thou, like a sovereign great and good,
Thy arms extended far and wide,
Thou screened us from the tempest
rude,
Nor basely robbed us, when thou
died.

Ah, no; great tree, thy heart declares,
That man was deeply graven there;
The moral lesson read, ye kings,
Do good, and thus for heaven
prepare.

Oak of the forest, take the hint,
Short is the day; tho' high thy head,
The watchman soon will cut thee down,
And lay thee with the silent dead.

[We are indebted to Mr. G. Dodds, Antrim, for sending us the above interesting particulars and verses, which he states are extracted from an old Book entitled, "Ireland exhibited to England in a Political and Moral Survey of Her Population." By A. Atkinson, Esq., and published in London, by Baldwin, Cradock, & Joy, Paternoster Row, in 1823.—ED.]





CARPETING BIG TREES.—There is no more pleasing feature to be seen just now at Hampton Court, says "A. D.," in the *Garden*, than the dense carpets of greenery which cover the borders beneath large trees that overshadow the broad walk leading from the Lion Gates. Here small laurels, aucubas, privet, mahonia, and similar evergreens are planted somewhat densely, and no doubt frequently renovated, as it is not possible that these shrubs would remain so healthy beneath these lofty trees for any lengthened time. No doubt the flower beds, especially the carpet beds, present the greatest attraction to the multitude, but no gardener could fail to appreciate the great effort thus made to make these tree borders look so green and full of vigorous leafage.

THE MOUNTAIN ASH.—The mountain ash is generally associated, at least in history, with glens and mountain passes, rocky defiles and steep ravines, but it also finds a home, a more familiar home, in the grounds and shrubberies of large estates all over the country. I was, however, hardly prepared to see it by the roadside between Stamford and Ketton, a few days ago in front of a neat roadside cottage, and overhanging a white wall, where its clusters of scarlet berries had a most beautiful effect.—"Looker Round," in *Gardeners' Chronicle*.

A NEW VINE.—The discovery of the new annual vine in the Soudan by M. Lecard has been confirmed by a Portuguese explorer, Count Henri d'Arpoare, who has discovered an analogous plant in the forests of Portuguese Guinea. It is believed that the new species, which has been named after its discoverer *Vitis Aapoaris*, may be advantageously grown at Cape Verde and Madeira, where the phylloxera threatens the destruction of the existing vineyards.

SEATS FOR THE PUBLIC.—The National Health Society has recently placed seats along the New Kent Road, under trees already growing there. It is stated that the Vestry is the only body that has, as

yet, accepted the offer of the society to erect seats and plant trees in such situations as may conveniently serve as points of rest.

THE BARBED-WIRE FENCE.—"Out in Kansas," says the *Lumberman*, "a new and unexpected peril has been found in the use of that barbarous barrier, the barbed-wire fence. There have been several instances of cattle being struck by lightning while standing near barbed-wire fences, and now a case is recorded of a farmer who received a severe shock while opening a gate, which was made by hooking the wire to posts. Wooden gates only should be used where barbed-wire fences are to be passed through. A remedy for the entire barbed-wire nuisance would be to make not only the gates of wood, but the fence as well."

AUTUMNAL LEAVES.—A novel feature of the approaching book season will be the production, in a new volume by Mr. Francis George Heath, of a series of coloured plates, representing facsimiles of autumnal leaves. The author believes that no work giving coloured figures of autumn leaves has ever been published in this country. The subject of Mr. Heath's new book, which will be published by Messrs. Sampson Low, Marston, & Co., will be further illustrated by full-page and vignette wood engravings, which are being drawn for the work, and will accompany descriptions of some autumn rambles.

THE VARIEGATED DOGWOOD.—There are now several good varieties of *Cornus* or Dogwood that make beautiful shrubs, either as single specimens on grass, or in the foreground of mixed shrubberies. *Cornus alba sibirica variegata* is very pretty, and a newer variety, called *Cornus Mas aurea elegantissima*, is a beautiful addition to this useful group. They are thoroughly hardy, and the beautifully variegated foliage assumes lovely tints in autumn, rendering this Dogwood a most effective object in the pleasure-ground.—"J. G. L.," in the *Garden*.

LARGE ELM TREES.—The Hartford (U.S.) *Times* says that in Deerfield, Mass., the Williams elm measures in circumference, at one foot from the ground, 26 ft.; at four feet, 19 ft.; at seven feet, 20½ ft. Another elm measures, at the same elevations, 27, 18½, and 19 ft. Another measures 21½, 15½, and 13½. This last-named tree has a spread of 100 ft. The Williams elm measured in its spread at least 150 ft.

THE VIRGINIAN CREEPER.—"A. D.," writing to the *Gardeners' Chronicle*, says, "I came across some very beautiful effects produced by the Virginian Creeper the other day, resulting from simply allowing it to climb up amongst deciduous trees, and running hither and thither as it lists. Thus, just now, when its autumn tints are put on, the colour was not seen in the mass as upon a wall, but bunches of it showed here and there, and the effect was extremely beautiful. There are plenty of trees about far from luxuriant in the matter of foliage, which would be all the better for a little more leafage, and this the Virginian Creeper would freely give. Then the autumn tints would for the time give colour of the richest kind, and when the leaves had fallen Nature would lose nothing by having in the trees the addition of the interlacing and graceful pendent growth of the climber."

PRUNING CONIFERS.—There is a prevalent notion that conifers do not like pruning; and in many cases trees that would make good specimens get ruined from want of a little timely attention in this way during their earliest stages of growth. In forests, where trees are planted thickly, there is no chance for them but to run up straight; they get crowded by their neighbours, and lose their lower branches by reason of the dense shade in which they are placed; but when planted at wider intervals for ornamental purposes the side branches retain their vigour, and unless checked by timely pruning rob the leader of its proper supply of sap, until, instead of making a handsome pyramidal tree, it becomes merely a scrubby bush. Now, I find that where they have made several leaders, and have become quite stunted in growth, they may be renovated by careful pruning, although, of course, the process is slow, for conifers will not make shoots from old hard wood like a deciduous tree; but by keeping all the lower branches stopped

in for a time, a leading side branch will straighten up and become a good leader.—*Field*.

A TREE PLANTED BY QUEEN MARY.—A correspondent of the *Scotsman* writes:—"Many of your readers will be familiar with that gigantic plane tree—among the largest in Mid-Lothian—which occupies part of the footpath on the east side of the road at Little France. For some time this splendid plane, known as 'Queen Mary's Tree,' which has been visited by foreigners for generations, is now giving unmistakable signs of decay, so much so that fears are entertained that it may yield to the first western gale, the effect of which would be to inflict serious damage upon the farm steading, and involve the sacrifice of the lives of horses and cattle. The attention of the proprietor, Mr. Little Gilmour, having been called to the matter, that gentleman has recently visited the tree, and after consulting several of the best authorities, has reluctantly given instructions to have the top cut off, so that it may offer less resistance to the elements. It is to be hoped by this experiment young shoots will again spring out, so that this historical relic of Queen Mary will be preserved. The tree, it is understood, was planted by Queen Mary in the presence of Rizzio and several other of her retainers while resident in Craigmillar Castle."

HARDHOOD OF LAURELS.—It is a fact that the common laurel went down before the intense frost of 1880-81, and much damage was done to large breadths and bushes of this old evergreen; but the Caucasian and the round-leaved laurels did not suffer nearly so much as the common form, if, indeed, they may be said to have suffered at all. At the nurseries of Messrs. John Perkins & Son, at Northampton, and in those of Messrs. George Bunyard & Son, at Maidstone, the same result was noticeable, and especially so in the case of plots of each variety growing side by side. The two forms of hardier character will in all probability drive the common laurel out of cultivation, and especially so as they are decidedly of a handsomer habit of growth and more robust. The Colchic laurel is apparently hardier than the common kind, yet not so good in all respects as the two varieties before mentioned.—*R. D.*, in *Gardeners' Chronicle*.

THE JOURNAL OF FORESTRY & ESTATE MANAGEMENT.

SHERWOOD FOREST, AND SOME OF ITS MORE NOTABLE TREES.

(Continued from page 399.)

SHERWOOD FOREST, especially that portion which includes and surrounds Welbeck and Clumber, has ever been as famous for the grand and majestic character and the soundness and high-class quality of its oaks, as for its picturesque beauties and the peculiar excellence and abundance of its game. At various periods many of its best and soundest oaks have been cut down for use in public buildings and in other works, but some of its oldest and finest trees have remained untouched and unscathed except by time. To some of these I shall now proceed to direct attention.

Among gifts of Sherwood timber for public purposes one of the most interesting was a grant by the then Duke of Newcastle, to whom Welbeck belonged, of oak trees, towards the rebuilding of St. Paul's Cathedral, after the great fire of London. The nobleman by whom this grant was made was John Holles, fourth Earl of Clare, who by his marriage with the Lady Margaret Cavendish, daughter and co-heiress of Henry Cavendish, second Duke, Marquess and Earl of Newcastle, Earl and Baron of Ogle, Viscount Mansfield, Baron Cavendish of Bolsover, and Baron Bothal of Hepple, had acquired the Welbeck and some other estates of the Cavendishes. The Earl of Clare was, consequent on his marriage, in 1694, raised to the dignity of Duke of Newcastle. He died in 1711 at Welbeck, through a fall from his horse, leaving issue an only child, his daughter and sole heiress, the Lady Henrietta Cavendish Holles, who, marrying Edward Harley, second Earl of Oxford and Mortimer, the founder of the famous Harleian collection of manuscripts, &c., carried to him the Welbeck and Bolsover estates of the Cavendishes, while the other estates were left by her father's will to his nephew, Thomas Pelham (son of Baron Pelham), with authority to bear the name and arms of Holles in addition to that of Pelham.

In default of male issue, the titles of Duke of Newcastle and Earl of Clare became extinct on the death of that peer, and his nephew

and heir, Thomas Pelham-Holles, was created successively Baron Pelham of Stanmere, Earl of Clare, Viscount Haughton, Marquis of Clare, Duke of Newcastle-upon-Tyne, and Duke of Newcastle-under-Lyme, with remainder to the heirs of Henry Clinton, seventh Earl of Lincoln, by one of whom he was succeeded in the dukedom, and thus laid the foundation of the present ducal house of Newcastle.

Edward Harley, Earl of Oxford and Mortimer, whom I have named as having married the Lady Henrietta Cavendish-Holles, left an only daughter and heiress, the Lady Margaret Cavendish Harley, who, having married William Bentinck, Duke of Portland, brought the Welbeck and other estates to him.

Connected with the grant of oak trees towards the rebuilding of St. Paul's Cathedral, his Grace the Duke of Portland has in his possession an autograph letter of Sir Christopher Wren. The original letter was, with others, lent by the late Duke for exhibition at the Worksop Meeting of the Lincoln Diocesan Architectural Society, from whose Proceedings I here copy it. It is as follows :—

“ For Mr. Richard Neale,
“ Steward to His Grace the Duke of Newcastle,
at Welbeck.

“ Lond., April 4th, 1695.

“ Sir,

“ Having in my Letter of June 23, 1695, signified to you a particular of all the scantlings of the Timber wee might use in the rooffe of St. Pauls, that His Grace's noble benefaction might be as usefull as may be to the worke, and understanding that what is already designed is none of the Great beams, weh is what wee are most sollicitous for, and being given alsoe to understand that wee must expect this season but Ten of the great Trees ; I presume once more to acquaint you with the scantlings of the great Beames to prevent mistake.

47 feet long, 13 inches and 14 inches at the small end,
growing timber, this scantling to hold die square,
as neer as can be without sap.

“ Mr. Longland, our chiefe Carpenter, will be sent down this season to take care of this concerne, & the timber brought down to Bawtre, whom I desire you to converse with in particulars weh at this distance I can hardly determine, and beseech you to present with all advantage our utmost sence of his Grace's Favour, of weh also I am very sensible, as becomes

“ Your humble servant,

“ C^R WREN.”

It is an interesting fact in connection with the oaks of Sherwood Forest that on various occasions when trees have been felled, and their timber cut up, royal marks have been found upon them, but grown up with age. Some of these were recorded and engraved by Major Rooke in his now scarce pamphlet of 1799, entitled “ A Sketch of the Ancient and Present State of Sherwood Forest, in the County of Nottingham,” and have been reproduced in “ Worksop, the Dukery, and

Sherwood Forest," by Mr. Robert White,* from which I transfer these engravings and notes. "In cutting down some trees in the hays of Birkland and Bilhagh, in Sherwood Forest, letters have been found cut and stamped in the body of the trees, marking the king's reign." Of these he [Rooke] gives four plates, which are here reproduced. "No.

No. 1.



No. 2.



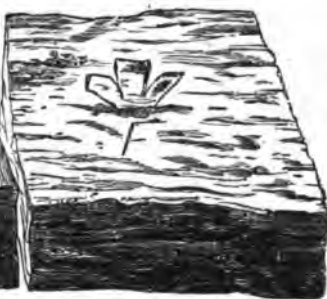
ROYAL MARKS ON OAK TREES IN SHERWOOD FOREST.

1," he says, "has hollow or indented letters I and R, for James Rex. No. 2 has the same letters in relief, which filled up the interstices of the letters in No. 1, before the piece was split. It is remarkable," he adds, "that where the bark has been stripped off for cutting letters

No. 3.



No. 4.



ROYAL MARKS ON OAK TREES IN SHERWOOD FOREST.

the wood which grows over the wound never adheres to that part, but separates of itself when the wood is cut in that direction. The piece No. 3 has the letters W M, with a crown, for King William and Queen

* To this highly interesting work, of which, I believe, a new and much enlarged edition is in preparation, I would call special attention. It abounds in useful information, is well and carefully printed, and, its contributors being all men of note, is well written, and reliable throughout. To Mr. White, who deserves more than a passing word of praise for the excellence of all the works that issue from his press, I am indebted for the loan of these and some other of the engravings that illustrate this chapter.

Mary. No. 4 has the letter I, with an imperfect impression of a blunt radiated crown, resembling those represented in old prints on the head of King John; another piece, cut out of an oak some years ago, had the same kind of crown, with I O, and R, for John Rex. The piece of oak, No. 1, with the letters I and R, was about one foot within the tree, and one foot from the centre; it was cut down in the year 1786. That with W M and a crown was about nine inches within the tree, and three inches from the centre; cut down in 1786. The piece marked I for John was eighteen inches within the tree and above a foot from the centre; cut down in 1791. William Kitchen, of Wellow, woodman to the Earl Manvers, in converting an oak felled in the forest near Ollerton Corner, into park-fence posts, in the year 1834," continues Mr. White, "found at the depth of fifteen inches from the surface the initials C R impressed upon the wood. The piece was preserved and given to William Clutton, Esq., of Penge, who was at that time and for many years a resident in Sherwood Forest, and who now affirms that while there he frequently saw such marks on old trees."

Many of the trees around Welbeck were cut down, it is said, "by the rebels" when that place became, for a time, a prey to them during the civil war, but many of the finest nevertheless escaped the despoiler's hand, and have grown venerable with increased age. In that part of the grounds known as "The Wilderness," in the various drives that intersect the forest, in the remains of "Merrie Sherwoode," which form part of the estate, and, indeed, in all directions throughout the domain, oaks of many centuries old, limes of marvellous beauty, chestnuts of enormous growth, and other forest trees of unsurpassed beauty and grandeur, attest to its past glories and give it an atmosphere peculiarly its own.

Among the most venerable and famous of the oaks of Welbeck the well-known "Greendale Oak" claims the first place. This oak, which has well been named "the Methuselah of Trees," is of all others the most curious, venerable, and interesting. It stands about half-a-mile south of the abbey, and is computed to be one of the oldest trees in existence in this country. Throsby, in his "Thoroton," supposed it to be, when he wrote, "upwards of 1,500 years old," and Major Rooke, a few years previously, that it was "thought to be above 700 years old, and that from its appearance there is every reason to suppose it has attained to that age at least;" thus opinions of contemporary people varied some 800 years in their computations. In Evelyn's time it was 33 ft. in circumference at the bottom, the breadth of the boughs was 88 ft., covering a space equal to 676 square yards. On Dr. Hunter's plate, in his edition of Evelyn's "Sylva," published January 1st, 1776, the

measurements are given thus: "diameter of trunk near the ground, 12 ft.; diameter of trunk at the top of the arch, 11 ft.; girth of ditto, 34 ft. 10 in.; diameter of trunk at widest part above the top of the arch, 13 ft. 3 in.; height of the tree from the ground to top of highest branch, 58 ft. 6 in.; height of the archway, 10 ft. 2 in.; width of archway, 6 ft. 2 in." Major Rooke declared its

John Venn.



The Great Oak Tree near Kilkenny, 1771.

measurement in 1790 to be thus: "the circumference of the trunk above the arch is 35 ft. 3 in.; the height of the arch, 10 ft. 3 in.; width about the middle, 6 ft. 3 in.; height to the top branch, 54 ft." The trunk having a century or two back become hollow with age, and so much decayed that large apertures occurred in its sides, the opening was, in 1724, sufficiently enlarged, by cutting away the

decayed wood, to allow an ordinary carriage, or three horsemen abreast, to pass through. Under this archway (or "tunnel" as it has been not inaptly described) through the trunk one of the noble owners is said, with his bride, to have been driven in a carriage drawn by six horses on the occasion of his marriage. This remarkable tree has been repeatedly engraved; one of the most curious series of representations being a set of four views, with a plan, etched in 1727, by the celebrated engraver, George Vertue, for the Earl of Oxford. Of one of these curious old folio copper-plates I have given a reduced facsimile; it represents this very carriage with six horses being driven through the opening. The others show horsemen, &c.,



THE GREENDALE OAK.

passing through the tree. Another plate, drawn by Grimm, engraved by Rooker, and published by Dr. Hunter in his edition of Evelyn's "*Sylva*," in 1776, also shows a horseman passing through it.

In 1727, the date of the first of these engravings, the Countess of Oxford (Lady Henrietta Cavendish Holles, daughter of John Holles, Earl of Clare, afterwards Duke of Newcastle, by his wife, Lady Margaret Cavendish), to whom Welbeck belonged, and by whose marriage with Edward Harley, second Earl of Oxford and Mortimer, it was conveyed to that nobleman, had a cabinet made from a portion of the wood taken out of this identical opening—the very "heart-of-oak" of the Greendale oak tree—and this fine piece of furniture is still

carefully preserved at Welbeck. This cabinet, which has never before been fully described, measures 7 ft. 6 in. in height, 6 ft. in width, and 2 ft. 2 in. in depth. As it is perfectly unique in style, character, and historic interest, and of paramount importance as connected with one of the most remarkable trees anywhere existing, I proceed to give, for the first time, and from my own personal notes, prepared for another purpose, some particulars of its ornamentation.

The cabinet is divided into two heights with folding-doors. The upper pair of folding-doors are each divided into four panels, and the lower pair each into two panels, and in all cases they are separated from each other by inlaid borders. I have endeavoured by the simple diagram here appended to show the arrangement of the various designs that occur on these panels, which are identical with Vertue's engravings to which I have just now alluded. On the upper pair of doors the panels I have marked 1, 2, 3, and 4 each contain a view of the Greendale Oak, with a man on horseback riding through it. Above each of these, at A, are the

A	C	A	C
1	6	3	8
B	D	B	D
C	A	C	A
5	2	7	4
D	B	D	B
E	G	I	K
9	10	11	12
F	H	J	L

words, "*Lo, the Oke!*" and beneath each, at B, "*The Green-Dale Oke, near Welbeck, 1727.*" On each of the panels which I have marked 5, 6, 7, and 8 is a similarly inlaid and painted view of the same tree, from the opposite side, showing, as in the engraving here given, a carriage drawn by six horses being driven through it, the driver and the postillion on the front horse being each habited in red coat and cocked hat. Above each of these, at C, are the words "*Una Nemus,*" and beneath each, at D, "*The Green-Dale Oke, near Welbeck, 1727.*" On each of the panels of

the lower pair of doors are, where I have put the numbers 9 and 12, a side view of the tree, denuded of its top branches, with railings and hedge at the back. Above each of these, at E and K, is the following quotation from Ovid :—

"Sæpe sub hâc Dryades festas duxere choreas :
Sæpe etiam manibus nexis ex ordine, trunci,
Curcuere modum : mensuraque roboris ulnas,
Quinque ter implebat. Nec non et cætera tanto
Silva sub hâc sylvâ quanto jacet herba sub omni."—*Ov., Met.*

and at F the words, "*The Green-Dale Oke, near Welbeck, 1727.*" On each of the panels which I have marked with the figures 10 and 11 are views of the tree, with a man on horseback riding through, but this time showing the back of both horse and rider. At the top of each, at G and I, is the following quotation from Chaucer :—

"Lo the Oke ! that hath so long a norishing,
 Fro the time that it ginneth first to spring,
 And hath so long a life, as we may see ;
 Yet, at the laste, wastid is the Tree."—*Chaucer.*

The ends of the cabinet are separated into three panels in height, two in the upper and one in the lower portion ; the end to the right has in its upper panel the same view of the tree and the same wording as already denoted on front panels 1, 2, 3, and 4 ; the middle panel same as panels 5, 6, 7, and 8 ; and the lower panel is remarkable as bearing a plan of that part of Welbeck Park where the Green-dale Oak stands. In the centre is represented the ground plan of the tree with the opening, and the dimensions marked thus : " 12 feet," " 10 feet," " 6 feet," " *The road to Welbeck,*" and " *Path Way,*" all accurately laid down and marked, as is also the situation of " *a small oke 4 feet diameter,*" not far away. At the side of the plan are the monogram, coronet, and motto of the countess, " *Virtute et Fide ;*" at the top, in six lines, the words, " *A Plan of the Great Oke call'd The Green-Dale Oke, in the Lane near Welbeck, in Nottinghamshire,*" and at the bottom, " *The Arch cut thro' the Tree 10 feet 2 Inches high.*" " *These Draughts taken 31 August, 1727.*" The end to the left has in its upper panel the same view of the tree and the same wording as already described on the front panels, 5, 6, 7, and 8, the middle panel same as those marked 1, 2, 3, and 4, and the lower one is a repetition of the plan just described.

The Greendale Oak as it now stands propped, supported, chained and lovingly preserved on all sides, is assuredly the grandest "wreck of ages" that any forest monarch in appearance presents, and it still gives out rich foliage in its upper branches, although its trunk seems in most parts to be little more than "touchwood." And there may the tree long stand !

"So grand in weakness—e'en in his decay
 So venerable—'twere sacrilege t' escape
 The consecrating touch of time."

* * * *

"Time hollowed in his trunk
 A tomb for centuries, and buried there
 The epochs of the rise and fall of States,
 The fading generations of the world,
 The memory of men!"

The "Parliament Oak," so called because it is traditionally asserted that Parliaments were on some occasions held beneath its boughs, is, if possible, even a greater wreck, caused by time, than the Greendale Oak. The "Parliament Oak" is in a nook by the side of the highway leading from Edwinstowe to Mansfield, at a point where that road is intersected by a private way of the Duke of Portland's. It is said that in

1212 King John, who had a palace close by at Clipston, in the forest, held a hastily-summoned Parliament, or council, under the branches of this very tree. "John, this year," says Bailey, "perpetrated the enormous cruelty of putting to death, by hanging, at Nottingham Castle, twenty-eight youths belonging to the most powerful and illustrious families of Wales, which youths he had brought with him after the rebellion, as hostages for the future peace and submission of the principality. At the time this event occurred the king was indulging himself in the pleasures of the chase, at his favourite place of retirement from the cares of government, Clipston Palace, when a messenger arrived from his sister Joan, who was married to Llewellynn, Prince of Wales, informing him of a fresh revolt, and at the same time another came with a letter from his friend and ally, David I., King of Scotland, apprising him of the existence of a widespread conspiracy against him among the barons and others in the northern parts of the kingdom. Hastily summoning a council of the barons and other distinguished individuals, who were about his person or in the immediate vicinity of the palace, they met under the boughs of an oak tree, in the park, which thence obtained the appellation of the 'Parliament Oak,' the trunk of which still is, or up to a recent period was, in existence. John here related to the assembly the contents of the message he had just received, and demanded of them, in a great rage, that they should give their consent to the immediate execution of the Welsh hostages, which were detained in the castle of Nottingham, which diabolical demand, after a short consultation, and without any particular inquiry as to how far all or any of the fathers of these hapless youths were involved in the guilt of the rebellion, was acceded to by all present. So resolute was the tyrant in having his bloody resolve promptly and surely carried into effect that he swore 'by the teeth of God' (a common form of oath with him when in a state of excitement) that he would not eat bread again until with his own eyes he had seen them all put to death. Mounting his horse, therefore, and summoning his attendants to accompany him, he rode with all possible speed to Nottingham. Having, on his arrival, informed the Governor of the purport of his visit, the youths, many of them mere boys of the tender age of twelve or fourteen years, and at the time of the mandate of the tyrant being issued enjoying themselves within the precincts of the castle in sports suitable to their age, were all seized, bound, carried to the ramparts, and there hanged in a row. John having thus temporarily satiated his vengeance against the nobles of Wales, by the murder of their children, returned to Clipston to dine, and again to recreate himself in the pleasures of hunting and like diversions."

Another writer, Stacey, says, of later Parliaments being held under

the branches of this same oak :—" We have frequent evidences of their [our monarchs] having sojourned and even held their Parliaments here [Clipston]. One example of this occurred in 1290, when Edward I. summoned a Parliament to meet here on the 29th October, which, however, did not come together till the beginning of November of that year. An ancient oak, formerly in the park, now on the side of the road leading from Edwinstowe to Mansfield, has long been pointed out as the place where these Parliaments assembled, hence called the 'Parliament Oak.'" Rooke, in 1790, wrote:—" There is a very old oak in Clipston Park, about five miles south-east of Welbeck, which the common people call the Parliament Oak, from an idea that a Parliament was once held under it. I have not



THE PARLIAMENT OAK.

found any good authority for this fact, but it is certain that a Parliament was held by Edward I., anno 1290, at Clipston Palace, the ruins of which are now to be seen not a mile and a half from the oak. . . . The circumference at one yard is 28 ft. 6 in."

This remarkable tree, this living ruin of a once hale and grand monarch, which has been not inaptly described as a "decrepid patriarch of Sherwood forest," is here engraved, but since this engraving was done "the battle and the breeze" which it has "braved" for so many centuries have told upon it piteously and rendered other shorings and the addition of strong iron chains necessary for its support and preservation. When I visited it but a short time back,

strong beams of wood were firmly fastened across the top of the decayed trunk, from one of the fragments to another, and chains



THE SHAMBLES OAK.

were passed round so as to give a much-needed support and prevent those fragments from falling to the ground. Grand in its age, venerable in appearance, majestic in its loneliness, sad as an emblem

of utter wreck, but with undying vitality to send out year by year a fresh glory of leaves on its scant branches, and to produce crops of acorns as it did more than a thousand years back, the Parliament Oak stands, lovingly cared for, an immutable witness of the mutability of Kings and Parliaments, and the decrees they have made beneath its wide-spreading branches. What remains of the trunk is merely three



THE BUYSDALE OAK.

or four portions—mere fragments comparatively with its original size—of the shell from which all the interior has decayed away. One of these portions has, like some other notable oaks to which I may yet take another occasion to call attention in these pages, gradually curled itself round, and become covered with bark, until it has formed itself into what may be called a perfect but miniature trunk, which doubtless will for very many years preserve its vitality.

The "Shambles Oak" is another remarkable example of decayed greatness and prolonged vitality. It is traditionally said that in its hollow trunk Robin Hood and his "merry, merry men" used to hang up their venison, as they would in a butcher's shop, until wanted, and that near it much of their cooking was done and revels kept; some of the hooks are said still to be seen in the interior. In later times, too, it is said this selfsame tree was long used by a sheep-stealing butcher as a kind (if not of slaughter-house) of shop wherein he hung his carcasses and joints until he could dispose of them in neighbouring places. From these circumstances the tree acquired its name of the "Shambles Oak." Some few years back some luckless and highly reprehensible individuals lit a fire in the hollow trunk, with the unfortunate result that the tree was set



THE MAJOR OAK.

afire, and was with difficulty saved; its interior is now a charred mass.

The "Ruysdale Oak," to which my attention was called by the late Duke of Portland, was so called by him because it was in shape and condition precisely one of those peculiarly formed trees that that great painter delighted to introduce in his pictures. It stands on a commanding eminence in the park, not far from the "Seven Sisters," and forms a striking object from whichever side it is seen; notably from the mansion itself. Venerable in its age, lovely in its decay, picturesque in its every phase, this "grand old oak" stretches out its weird-like naked branches in every direction, and forms a landmark that cannot well be mistaken. From it are obtained some strikingly beautiful views of the mansion, the lake, and the grounds. In the engraving I have pleasure in here giving, the situation of Welbeck Abbey is indicated in the mid-distance.

The "Major Oak,"* as now called, or "Queen Oak," or "Cock-pen Oak," as it used to be named, measures at four feet from the ground 29 ft. in circumference, and the area of ground covered by its branches about 300 ft., while its height is about 80 ft. My old friend, "The Sherwood Forester," wrote of this tree:—

"A considerable portion of its tendons are seen above ground, and measuring these about halfway between their junction with the trunk and their insertion in the earth they gave a circumference of nearly 30 yds.; the circumference of the trunk at nearly six feet from the ground, the height at which begin the branches, was 30 ft.; the circumference of one of the arms at a distance of four feet from the trunk was 12 ft., that of its outspread branches 240 ft. The recess in its trunk—for with all its superincumbent mass of branch and leaf it is quite hollow—afforded a diameter of nearly 7 ft., and a height of 15 ft., was, in short, not unlike one of those dark circular towers we sometimes find in ruined castles. Seven persons at once have been known to take a meal in it; while no doubt, with a little contrivance, it might have accommodated more. This cavity has a narrow but convenient opening to the south, and commands a pleasant look out into the forest, whilst affording excellent shelter. It was at one time called the 'Cock-pen Tree' from its interior being occupied as a hen-roost."

One of the former famous trees of Welbeck was an oak known, from the straight, tall character of its trunk, as "The Duke's Walking Stick." Its height in 1790, as measured by Hayman Rooke, by whom it was engraved, was 111 ft. 6 in.; to the main branches 70 ft. 6 in.; the circumference at the bottom, taking in some projecting spurs, 21 ft.; the circumference at one yard from the ground 14 ft.; at two yards, 12 ft.; the solid contents 440 ft.; and the weight 11 tons. This tree is now no more, but another tree, a "Young Walking Stick," is in full vigour, and is about 100 ft. in height, and of a century and a half's growth.

"The Two Porters"—a pair of grand old trees standing some little distance apart—were engraved in 1790, described as "two noble oaks, which make a most conspicuous figure in every point of view. They are called the Porters from there having been once a gate between them. The height of one is 98 ft. 6 in.; circumference at the bottom 38 ft.; at one yard high 27 ft., at two yards 23 ft.; the solid contents 840 ft. The height of the other is 88 ft.; circumference at bottom 34 ft., at one yard 23 ft., and at two yards 20 ft.; solid contents 744 ft." These grand old trees, one of which has lost its top, have become somewhat sparse of foliage, through age, but still stand as they were wont, nearly at the north extremity of the park, not far from the south lodge of Worksop Manor, and the drive passes between them.

The "Seven Sisters," as another oak is called, is situated about half a mile from the Two Porters, and is one of the most remarkable trees anywhere in existence. It consisted originally of seven stems or trunks springing from one general root, and rising perpendicularly to a great height—no less than 88 ft.; the circumference of the common trunk

* So named, it is said, after Major Hayman Rooke, who often visited it, and wrote much on the forest.

close to the ground being over 30 ft. Some of the "Sister" stems have from time to time been blown down, but the tree is still noble and interesting.* Near it is a hollow tree, in circumference 20 ft. 9 in., supposed to be 300 years old, which was used as a place of concealment whence the keeper could aim at the deer. Its description nearly a century back was as follows:—

"The body of this tree is hollow from the bottom to the top, like a chimney, and is only 5 inches thick including the bark; where that has been stripped off on the other side there are only 3 inches of wood. In this tree the gamekeeper secretes himself when he shoots the deer, and there are small apertures for his gun.



SIMON FORESTER OAK.

On the inside is cut 1711; so that this excavation must have been of the same dimensions seventy-eight years ago as it is now, and the tree must have increased but very little in bulk since that time. For, if you allow it (which is granting too much) to have grown but one inch in seventy-eight years, there could not have been two inches of solid wood to support the trunk (which is 14 ft. high) and projecting branches when the date was cut. The circumference of this tree near the ground is 20 ft. 9 in.; at one yard high 14 ft. 6 in. In the year 1711 we may, then, fairly suppose it could not have been even one inch less in thickness; whence we may conclude that a tree of that size must then have been above 200 years old, which brings the age of it now to near 300 years. Setting aside its

* The measurements of the "Seven Sisters" were given nearly a century ago as follows:—"In height it is 88 ft. 7 in.; the circumference at the bottom is 30 ft.; at two yards, taking in the stems, 30 ft. 4 in. The largest stem at two yards is 12 ft. 10 in. in circumference; another at the same distance from its bottom is 11 ft. 7 in. in circumference; one 9 ft. 10 in.; and the smallest 5 ft. 3 in. in circumference."

hollow trunk, it has every appearance of a young flourishing tree. On the north side, to the height of about 9 ft., the bark has been stripped off from within 5 ft. of the bottom, which was most probably the effect of lightning. However that may be, it is certainly a remarkable instance of the strength of vegetation in supporting so large a head on so thin and, to appearance, almost decayed a trunk."

Another of the more famous trees, known as the "Simon Forester Oak," is here engraved. It has been, not very aptly, described as a "patriarchal senator of the woods," and is from 50 to 60 ft. in height, 22 ft. in circumference of the trunk, and its branches, which hang gracefully downwards, cover a large area of ground.

In addition to all these "named" trees, others of marvellous beauty and gigantic proportions so abound about Welbeck, Thoresby, Clumber, and other parts within the old confines of the forest that they may be counted by hundreds, and form a grand picture of the "blasted and battered ruin of a forest. A thousand years, ten thousand tempests, lightnings, winds, and wintry violence, have all flung their utmost force on these trees, and yet here they stand, trunk after trunk, scathed, hollow, grey, and gnarled, stretching out their bare sturdy arms," and still defying time and tempest, living relics of an almost primeval time, calmly and firmly awaiting an age when time shall be no more.

I may yet speak, in another number, of some of the other famous trees around the localities to which I have just alluded.

LLEWELLYNN JEWITT, F.S.A.

(To be continued.)

ANNUAL TIMBER SALE AT DARNAWAY.

THE annual sale of hardwoods took place at Darnaway Forest on Wednesday, the 19th October. The chief portion of the timber exposed was oak, which met with a stiff sale, particularly the medium and smaller sizes, and had to be parted with at less money than what was realized last year. The usual number of purchasers were not forward, which limited the competition and demand. The ash and elm, of which there was above the usual supply, met with a good sale. The demand for burnwood and firewood was fairly active, and satisfactory prices were obtained.

The following are the average prices realized : large oak from 1s. 6d. to 2s. per cubic ft. ; medium size from 10d. to 1s. 3d. per cubic ft. ; smaller sizes from 5d. to 8d. per cubic ft. Ash—special lots 2s. 6d. per ft. ; medium size from 1s. 6d. to 2s. ; inferior lots from 9d. to 1s. Elm—first quality from 1s. 4d. to 1s. 7d., second from 9d. to 1s. Oak burnwood, about 12s. per ton ; birch for bobbins, 10s. per ton ; firewood, from 6s. to 9s. per dozen. The buyers in all cases being at the expense of removing their purchases. The principal were—Messrs. Wilson, Bain, and Menzies, Forres ; Rose, Nairn ; Asher, Burghead ; Findlay, Henderson, Ledingham, Hopeman, and Stephen, Banff ; cartwrights, purchased the chief of the ash and elm.

MANUFACTURE OF CHARCOAL AT PENRHYN CASTLE.

WOOD is essentially composed of carbon, oxygen, and hydrogen ; by the action of heat it is decomposed, the oxygen and hydrogen expelled, and charcoal, or carbon in an impure state, left remaining.

When a quantity of charcoal is burnt there always remains a portion of ashes, consisting of saline matter which had been taken up from the soil in which the tree grew that produced the charcoal.

Two different methods are now employed in the preparation of charcoal, one that of piling the wood in a heap, covering with turf and setting on fire, the other by placing the wood in an iron cylinder set in brickwork, and surrounding with fire. As the first method is that generally adopted, and also carried out here, I purpose giving a description of the mode of operation.

A piece of ground sheltered from the prevailing winds, and in a position to which easy access with wood can be obtained, is set apart for the charcoal making ; a shed is also attached in which the charcoal is stored and a part reserved for the use of the men employed at the work. The wood is carted in at any time when obtainable, and convenient to spare horse labour from other parts of the forest work, and consists of all kinds of hardwoods (poplar and willow excepted) in size not under two inches diameter ; principally the larger pieces of firewood, or any unsaleable timber which may be come across in the regular course of thinning, are used for this purpose.

Amongst our timber trees oak, ash, and beech produce the largest quantity of charcoal, and of superior quality to most others, though that produced from some shrubs, especially the *Rhamnus Frangula*, is much in request for gunpowder making.

The wood is sawn into pieces 2 ft. in length, and these again split, if required, to about 4 in. square, and when a sufficient quantity has been cut up for two pits, the building of these is then proceeded with.

Here it may be necessary to state that it is much better to burn two pits at the same time, as both can be attended to during the charring process as conveniently as one, and do not necessitate the men sitting up at night for each separately.

The pits are usually made of a conical shape, 21 ft. in diameter, and about 9 ft. in height, the mode of construction being as follows :—A strong stake is driven into the ground, and left protruding about 12 in., around this are placed small pieces of dry ash of a similar length and standing as close to the upright stake as possible, around this being placed another layer in the same manner, and so on until a circle 4 ft. in diameter is obtained.

A circle 1 ft. in diameter, and having the top of the stake formerly driven into the ground as centre, is next made, by placing the wood horizontally on the upright pieces and side by side, repeating the same by laying others on these in a similar manner, until the pit is of the required height, the wood used here being dry pieces of ash, 24 in. in length, but split rather smaller than the ordinary pieces.

This forms a sort of chimney by means of which the pits are fired. Outside this the wood is placed on end and reclining inwards, this being continued until the pits are of the required size.

This being completed the pits are then covered with newly-cut turf, the grassy side being placed innermost, beginning at the base and working towards the top, each line of turf overlapping by a few inches the previous one, the circular hole or chimney being left open for firing. The turfs are cut about 1 ft. in width and any length convenient, the quantity required for two pits being seven loads.

Before turfing the top half of each pit they are carefully examined, and any crevices between the pieces of wood packed full of small pieces of turf and sawdust, to exclude the air. They are next fired by dropping a couple of shovelfuls of burning wood, and some dry pieces of pine or ash, into the opening left at the top; the top turf is then put on, which effectually shuts up the chimney, after which the process of charring commences. The smoke is first seen issuing from the lower half of each pit, where sawdust had not been used, and; ultimately, all over.

Constant attention is required, day and night, during the period of burning, and especially so should the weather be stormy, as the wind striking constantly on a particular part of the pit causes that side to burn very rapidly, and fall into a hole; should this occur, the hole must at once be filled with rough logs, which had been set aside for the purpose when splitting the wood, and re-covered with turf.

When the weather is mild the pits burn uniformly all over, require but little attention, and produce the finest charcoal. The time required in burning varies from seven to nine days, according to the state of the weather, dry and mild requiring the longest period.

As the charring proceeds, the turf gradually disappears, until only a slight covering of burnt earth remains, after which, and having become cool, the pits are ready for being opened, when it is found they are reduced to about half their original size.

The charcoal is extracted by means of a rake resembling a light drag, but having much finer teeth, and after becoming quite cold is stored in the shed until required for use. Before being sent in for consumption the charcoal is riddled, and any inferior or half-burnt pieces picked out.

By the mode already described the very finest charcoal is produced, far superior in quality to what is generally sold. Having run short, quantities were procured from London and Chester, but these were found inferior to the home production, and in one case the charcoal could not be used with any pleasure.

The expenses connected with making charcoal here are in advance of many places, especially where the retort is in use; but one advantage which can be claimed for pit burning is that charcoal can be made at any place where timber is being felled, and no extra expenses incurred, save the cartage of the charcoal, whereas in using the retort the wood must in most cases be conveyed to where this is erected.

In summing up all expenses connected with making charcoal here I find the cost to be about two shillings per bushel, which price, I have no doubt, would be considerably lessened were the retort in use, especially as a large quantity (about 1,500 bushels) is required annually.

ANGUS D. WEBSTER.

THE SCOTTISH ARBORICULTURAL SOCIETY.

THE twenty-eighth annual general meeting of the Scottish Arboricultural Society was held on Tuesday, October 4th, in the class-room at Royal Botanic Gardens, Inverleith Row, Edinburgh. The Most Noble the Marquis of Lothian, President of the Society, occupied the chair, and among those present were Sir Richard Temple, Bart., K.C.S.I., late Governor of Bombay; Professor Dickson; Emeritus Professor Balfour; Dr. Hugh Cleghorn, of Stravithie; Messrs. Robert Hutchison, of Carlowrie; J. W. Barry, of Park Hill, Fylingdales, Yorkshire; Isaac Anderson-Henry, of Woodend; Charles Jenner, of West Duddingston; John Sadler, Curator Royal Botanic Garden; James Alexander, James Welsh, William Welsh, John Methven, and John Lamont, Edinburgh; Alexander Morrison, Elgin; J. Watt, Carlisle; John Anderson, Perth; William McCorquodale, Scone; John McGregor, Ladywell; Malcolm Dunn, Dalkeith; R. Baxter, Dalkeith; C. S. France, Penicuik; John McLaren, Hopetoun; James Kay, Bute; Donald Fraser, Byram, Yorkshire; James Barrie, Stevenstone, Devon; William Forbes, Houstoun; James Gordon, Rossdhu; W. K. Rose, Alexander Buchan, Hugh Fraser, J. Grieve, Edinburgh, &c.

Before commencing the business of the session, the Marquis of Lothian performed the ceremony of planting a commemorative tree in the plot to the west front of the new class-room reserved for such purposes, and where already trees have been planted by T.R.H. the Duke and Duchess of Edinburgh, the King of the Sandwich Islands, the Earl of Aberdeen, and other notabilities. The tree selected for planting on this occasion was a fine healthy specimen of the giant arbor vitæ (*Thuja gigantea*), and the Noble Lord performed the operation in true practical style.

The party then adjourned to the class-room, where business was at once

proceeded with. Fifty-two new members were proposed, and duly elected, amid applause.

THE PRESIDENT'S ADDRESS.

The noble President said :—As this is the first time I have had the pleasure of meeting with the Society since I was elected president, my first duty is to thank you for the honour you have conferred upon me. I myself felt somewhat at a loss to know what I had done or what my antecedents had been which had led the Society to fix on me to be the successor of Mr. Adam to preside over your Society. I have spent four years in Persia and one year in Greece, but I do not think I ever was in a country where there are fewer trees than in those historic lands. On the western slope of the mountains, between Turkey and Persia, there is a narrow strip of stunted oaks, which are perfectly useless, but that is the only part of the country where trees are to be found in any numbers. I don't include the district between the Caspian Sea and Persia, which in many parts is covered by a dense, almost impenetrable forest. When Mr. Hutchison was kind enough to suggest to me that I might consent to be nominated as president, I took the liberty of stating, as a condition of that nomination, that I was not to be expected to deliver an address, which I feared my then state of health would not permit of, and Mr. Hutchison accepted that condition. On this occasion I am the less sorry on that account, for indirectly it has led to a great gain to the Society—the presence, namely, of Sir Richard Temple, who has kindly consented to attend a meeting this evening, and lecture to you on the Forests of India. Sir Richard Temple's name is known wherever the English language is spoken, and I am sure that everyone who hears him will go away with a great deal of very interesting knowledge, and with their ears delighted with the beautiful word-painting with which he has been so long acquainted. Although I am not prepared to deliver an address on the present occasion, there are one or two points to which I wish to refer. First, I would notice the loss which the Society has sustained by the death of our late president, Mr. Adam. All of you are perhaps much better acquainted than I can tell you with the great interest he took in the welfare of the Society, the great ability he showed in promoting its interests, and the loss that the Society has sustained by his being no longer among us. Mr. Adam had the faculty of making friends of all those with whom he met. I do not know that I ever met a man who had that faculty in a greater or stronger degree. Another loss the Society has sustained in the sad and sudden death of Lord Airlie. All who have ever been to Cortachy must know the vast improvement he has made on his estates since he succeeded to them. There are many others, I have no doubt, whose loss we have to deplore since our last annual meeting, such as Mr. Gorrie, of Rait Lodge. Another point of deep interest to the Society is the movement for procuring a Royal Charter. Mr. Adam alluded to the strong necessity there was for this in his presidential address. As you all know, a Charter is not very easy to obtain, but I think if any society is entitled to such an honour

this one is ; for I know no society whose objects are more national than those of the Arboricultural Society, considering the vast and imperial interests which are involved in the proper cultivation and maintenance of the woods and forests over the British Empire. We will feel Mr. Adam's loss as much in this as in any matter, for he would have been able to help us greatly in our endeavours to obtain a Charter. But we have still a vice-president of great influence—I allude to Lord Rosebery, who in his new and influential position will be able to assist us. I have heard from him, and in his letter he says cordially, that he will do his best to obtain a Charter for the Society. His influence, backing up our application, will, I have no doubt, go a long way towards obtaining it. But, even though we do not succeed in obtaining a Charter, I do not think we need despair. No doubt a Royal Charter would add to our influence and prestige, but even without it we would still be the Arboricultural Society of Scotland, and one must have great pleasure in reflecting that, as Scotland was the first to start a great national agricultural society, it was also the first to start a national arboricultural society. I come now to refer to the question of the institution of a School of Forestry, which I cannot help thinking—for a society such as this is—is second only in importance, if second at all, to the obtaining of a Royal Charter. If I were to name all the countries which have started a School of Forestry, I should name all the countries of Europe excepting our own. I think it is a very odd state of things that Great Britain is the only country in Europe without a School of Forestry, for I don't think there is any country in the world whose future is so much bound up in the maintenance of woods as we are in our vast possessions. Other countries have woods within their own boundaries, such as France and Germany, and these are managed according to rules adapted to their conditions. But we have Canadian woods, tropical woods, woods in India, and many others, and unless they are placed under proper conservancy they would all be destroyed. Take for instance the case of Australia ; though it is thought that the woods there are inexhaustible. There is an immense amount still to be learned there ; and unless proper care is taken of the forests, the people will only begin to see what they have lost when it is too late. I have been in Australia for some time, and I have travelled for days through gum tree forests. There are some who think that a gum tree forest must be monotonous, because the trees are all of the same kind. I cannot think that any one who talks so can have any real love of trees, for the love of trees is not confined to single trees, but also embraces great masses of them. I like great masses of trees, and never tire of them. I know nothing more beautiful in the world than to stand on a height in Australia and look over miles and miles—as you can do in that clear atmosphere—of forest, till the horizon is lost in a hazy blue, the stretch of waving trees being only broken by rocks standing up here and there. It was the most beautiful sight I ever saw. Of course there are other beautiful woods—woods mixed with every kind of palms, and others with pointed or rounded tops—but for a real lover of nature every kind of forest affords its own kind of beauty and pleasure. We cannot help

losing sometimes the fresh and childlike delight with which we have looked at forests in youth. It is said that a gardener has less pleasure in looking at his garden glowing with colour and loveliness, than one who has not had to labour for the propagation of the flowers and the effect which their combination produces. Perhaps that may be the case, but it is with flower gardening, and so also with arboriculture, that when the fresh pleasure is gone it is replaced by a much deeper joy; the delight, namely, of knowing every detail in the landscape, the garden, and the forest. Now this pleasure is to be gained by all those who have gone through a School of Forestry. A course for a School of Forestry in this country involves such a large amount of knowledge in different branches, that it is almost difficult to face it. But for energetic young men there is no better opening than that of learning forestry; for any one who can make himself master of the science is almost certain of gaining employment. The field is pretty well open, and those who are first in the field are the first to obtain advantage of the most attractive opportunities. I urge, then, those who love forestry to study it with the object of taking charge of woods in other parts of our empire. I feel that my remarks are getting rather long, but the subject of the study of forestry and the necessity of founding a school here is very attractive. Of course the great difficulty is getting a good piece of ground. I cannot help thinking that if it were possible the school should be established in some other part of the country than Edinburgh, more favourable to the growth of trees. Although this is a very beautiful district, I do not think it is favourable to the growth of trees, particularly pines; and there are other districts where an arboretum or forest might be more successfully carried out. I am sure that any proprietor whose estate was selected would be delighted to have all the trees tried in his neighbourhood. Another thing which is said to be against a School of Forestry in this country is, that there are no Government forests worth speaking about. The largest and best known is the New Forest, which extends to 63,000 acres. From my experience of the Government treatment of the New Forest, I should think that greater knowledge of arboriculture is required, for many magnificent old trees have been cut down in it. Large spaces were enclosed, and oak trees planted in rows, and between every row of oaks were two lines of pines, the whole presenting an appearance of a field of turnips with ridges of swedes. It certainly did not look beautiful, and if Parliament had not interfered the whole of the New Forest would have been like an enormous turnip field. I think a little more knowledge on the part of the Government of the proper management of forests, would have induced another and a better state of things. Another thing in which great interest is now being taken is, what I cannot help thinking, the progressive change which is taking place in our climate. Some time ago I noticed that the late Mr. MacNab gave a description of the change of climate he had experienced during the time he had known the Edinburgh Botanic Gardens. We all know that recent winters are not the same as those we have formerly experienced. But the proper way of testing this is by actual results. I was much

struck by the proofs brought forward by Mr. MacNab, more especially the enumeration of the plants that grew perfectly well at the time he first entered on the charge of the gardens, but which had gradually died out during the time that he lived here. That is the true test that some change of a climatic nature is going on. I think we must look forward to winters of greater severity than before. Plants that we looked upon as perfectly hardy, and which had existed for generations unharmed, have all suffered during recent winters. In my own place in Roxburghshire I know forty-eight different kinds of shrubs and trees which were looked upon as perfectly hardy, that were killed down to the ground by the frost of the last two winters. It has become a subject of great importance to know what kind of trees to plant on low ground; and although such a frost may not occur for a long time as was experienced last winter, still we must provide for the future. Two or three oaks which were, I should think, not less than 400 to 500 years old, were cut down to the ground, though they are not actually dead. I myself think that probably a great deal of damage was due to the wet season of the year before. Still that comes into the consideration of a climatic change. If we are to have no seasons to ripen the wood, of course our trees must die. Another subject of interest is the vitality of seeds found in turning up new soils. It is a matter of great moment to know what natural plants will come up when new soil is exposed. If we turn up the surface, fresh trees and shrubs and plants certainly come up. On the west coast of Scotland there was a district which had been utterly overwhelmed by drifting sand. The new proprietor, by trenching down to the old soil and planting, made a profitable investment of it. This was where the sand was shallow. In another place he found the sand eight feet deep. He had a portion of the original soil which had been buried under the sand for certainly sixty years, taken up and covered over with glass with just enough of moisture to damp the air. Yet forty seeds which had been buried for all that time below the sand germinated and grew. Another point of interest not much looked at is the difference of trees growing under nearly the same climatic influences in different parts of the world. It is very curious how some of the smaller plants growing in exactly the same conditions in places so widely apart as Great Britain and Australia are identical in species and habit, but how different it is with regard to trees. Take again the higher regions of Central America and compare them with corresponding regions in Europe—however much the shrubs appear to be the same they have always some specific difference which makes the difference between species. I think it would be a subject of great interest to find out the climatic differences which led to this variety. Before sitting down I return you my best thanks for having elected me President. I hope the Society will feel that I shall always do the best I can for furthering its interests, particularly in these two matters of obtaining a Royal Charter and the establishment of a School of Forestry; and that I shall do my best to make the Society, as the first of its kind started in Great Britain, worthy of the country in which it had its origin.

On the motion of Professor Balfour, a cordial vote of thanks was accorded to the noble President for his address.

TREASURER'S STATEMENT.

Mr. J. McLAREN, Secretary and Treasurer, submitted the financial statement for the past year. The charge amounted to £673 18s. 3½d., of which the subscriptions and arrears reached £164 7s. 0d., life membership £67 4s. 0d., and the sinking and ordinary fund, £347 1s. 4½d. The discharge amounted to £669 9s. 6½d., with a balance of £4 8s. 9d. Among the items of discharge were—prizes, £12; salary of Secretary and Treasurer, £40; expenses of printing transactions, reports, &c., £202 4s. 10d., paid into capital account, £67 13s. 4d., and the funds of the Society, £347 1s. 4½d. The nett funds of the Society now amounted to £396 4s. 9d.

Mr. HUTCHISON moved the approval of the report.

Mr. SADLER seconded the motion, which was adopted.

The Marquis of Lothian was appointed a trustee of the Society, in room of the Right Hon. W. P. Adam, deceased.

REPORT ON COMPETITIVE ESSAYS.

Dr. CLEGHORN, in submitting the report of the Committee of Judges on the Competitive Essays, expressed regret at the loss of his wise and experienced colleague, Mr. W. Gorrie, who had been so suddenly cut off soon after the last annual meeting. The council had nominated Mr. Sadler in room of Mr. Gorrie. The number of essays, fourteen, sent in for competition exceeded by three that of last year. There was also an excellent collection of cones, models of two very pretty rustic bridges, and a new straining pillar for wire fences. The awards were as follows:—

On Old and Remarkable Trees at Nelambur—(with photographs)—1st silver medal, John Ferguson, deputy conservator, Nelambur, Madras. On the Arboriculture of Holland, Rhenish Germany, and Belgium—2nd silver medal, James Duff, wood manager, Bayham Abbey, Tunbridge Wells, Kent. On the Natural Forests of South Australia—1st silver medal, George M'Ewin, Glen Ewin, Adelaide, South Australia. For £5 5s. offered by Mr. A. Mackenzie, Great Winchester Street, London, on the "Rearing and Management of Hardwood Plantations"—Andrew Slater, Wyreside Cottage, Lancaster, £2 2s.; and Thomas R. S. Milroy, assistant forester, Penicuik House, Penicuik, £3 3s. On the Best Size of Plants and Methods of Planting to produce the Best Results—1st silver medal, Andrew Slater, Wyreside Cottage, Lancaster; and 2nd silver medal, John T. McLaren, assistant forester, Scone, Perth. On Old and Remarkable Trees on the Estate of—2nd silver medal, James Barrie, forester, Stevenstone, Devon. On a New Straining Pillar for Wire Fences (with model and drawings)—1st silver medal, James Kay, Bute Estate, Rothesay. On the Pine Beetle, its Origin and Prevention (with drawings)—bronze medal, Robert Coupar, assistant forester, Scone, Perth. On the Pine Saw-Fly—By "Cui Bono," 2nd silver medal. On Tree Planting as an Investment—Prize of £3 3s., offered by the Proprietors of the *Journal of Forestry*, William Harrower, forester,

Cahir Estate, Cahir, Ireland. This paper, said the judges, relates to Ireland only; but so far as it went it gave the author's experience, and possessed considerable merit. Rustic Bridge—1st silver medal, Robert Keay, assistant forester, Scona. Rustic Bridge—1st silver medal, John Potter, Hope-toun. Collection of Cones, forty varieties—Gold Medal, James Barrie, forester, Stevenstone, Torrington, Devonshire. In the opinion of the Judges, the average standard of the fourteen essays submitted was considerably higher than in previous years.

The President said that these essay competitions were of great value, not only because they communicated useful information, but because they fixed and crystalized the ideas of the writers. Seeing that many of the essays were written by assistant foresters, he (the Noble Marquis) suggested that special prizes should be offered for competition by assistant foresters.

Mr. WILLIAM MCCORQUODALE warmly approved of this suggestion, more especially as some assistant foresters had stated to him that they would much prefer to compete only amongst themselves.

The subject was remitted to the Council, with instructions to arrange for a series of prizes restricted to assistant foresters.

ELECTION OF OFFICE BEARERS.

The following office bearers were unanimously elected for the ensuing year :—

President, the Most Noble the Marquis of Lothian, K.T., Newbattle Abbey, Dalkeith. *Vice-Presidents*, Robert Hutchison, F.R.S.E., Esq., of Carlowrie, Kirkliston; John M'Gregor, forester, Ladywell, Dunkeld; Colin J. Mackenzie, Esq., of Portmore, Eddleston, Peebles; the Right Hon. the Earl of Rosebery, Dalmeny Park, Edinburgh; Alex. Dickson, M.D., F.R.S.E., Professor of Botany in the University of Edinburgh. *Council*, James Robertson, forester, Panmure, Carnoustie; D. F. M'Kenzie, forester, Murthly Castle, Perthshire; William Craig, M.D., C.M., F.R.S.E., 7, Lothian Road, Edinburgh; John Sadler, curator, Royal Botanic Gardens, Edinburgh; Charles S. France, overseer, Penicuik House, Penicuik; D. Scott, wood manager, Darnaway Castle, Forres; Daniel Dewar, forester, Beaufort Castle, Beaully; James Kay, wood manager, Bute Estate, Rothesay; Malcolm Dunn, The Palace Gardens, Dalkeith; Peter M'Laren, forester, Altyre, Forres; Robert Baxter, forester, Dalkeith Park, Dalkeith; John Hutton Balfour, M.D., M.A., F.R.S.S.L. and E., Emeritus Professor of Botany, Edinburgh; Hugh Cleghorn, M.D., F.R.S.E., of Stravithie, St. Andrews; John Anderson, nurseryman, Perth; John Lamont, The Glen Nurseries, Musselburgh. *Secretary and Treasurer*, John M'Laren, jun. *Auditor*, John Ord Mackenzie, Esq., of Dolphinton, W.S.

A ROYAL CHARTER.

Mr. HUTCHISON proposed that they take steps this year to obtain a Royal Charter. The whole expense would be about £100, but the importance to the Society of a Royal Charter would make it well worth the expenditure. They could not do better than add to the Committee on the subject the President, Lord Lothian, and their new Vice-President, Lord Rosebery.

The proposal was unanimously agreed to.

REPORT ON EDUCATION.

Mr. DUNN submitted the report of the Committee on the Education of Foresters. The report, he said, was only a verbal one, because the returns to the queries sent to members of the Society on important points in connection with the subject, had not yet been all received, owing to the recent date at which they had been issued. In fact, only replies to a fifth of the papers sent out had yet been received; but 90 per cent. of the replies sent in were strongly in favour of the immediate establishment of a School of Forestry. The committee were anxious to obtain the practical views of practical men; and he trusted that the remaining replies would be sent in as soon as possible. He suggested that the whole matter should be transferred from the Special Committee to the Council, who could carry on the work all the year round, whereas the Special Committee could only report once a year, and it was a subject that could not be delayed.

The report was unanimously approved of, and the suggestion agreed to.

It was announced that Mr. McTier had presented books to the Society's library to the value of £100; for which handsome donation to the library the thanks of the Society were unanimously awarded.

EXCURSIONS FOR 1882.

Mr. HUTCHISON thought that the Council should consider whether the meetings of the Society should not be made a little more peripatetic—something like those of the Highland and Agricultural Society of Scotland, or the Royal Agricultural Society of England. He moved that it be remitted to the Council to arrange for the Society making an excursion next year to Lochlomond, Roseneath, and Inverary.

Mr. CHARLES JENNER seconded the motion, which was adopted.

VOTES OF THANKS.

On the motion of Mr. HUTCHISON, votes of thanks were accorded to Dr. Cleghorn, convener of the Judges' Committee, and to Professor Dickson, Regius Keeper of the Gardens, for the use of the class-room for their meetings.

After the other usual votes of thanks had been passed, the Marquis of Lothian retired from the chair, and the discussion on the following subjects was proceeded with.

MEASUREMENT OF TREES.

In the unavoidable absence of Lord Lothian, Dr. CLEGHORN, Vice-President, having taken the chair, Mr. J. W. Barry, of Park Hill, read a paper on "The Measurement of Trees, with special reference to the adoption of a more exact method of ascertaining their cubic contents for other than commercial purposes." Having in the outset stated that a paper published by him some four years ago in the *Journal of Forestry* was only a reconnaissance of the ground he desired to travel, he went on to allege as his reasons for selecting such a subject—first, that there exists greater ignorance of it amongst our own practical foresters than amongst those of other European countries; second, that it had been little treated of at headquarters; third, that as compared with other countries we possess but a meagre and scattered store of printed information relating to so important a ques-

tion; fourth, that his own studies during the past three years in the forests of both the north and south of Europe, the overhauling of the foresters' books and papers, the measurement of trees with the foresters themselves, and the comparisons thereby induced between our own and their systems of mensuration, had led him to reject the method now in use amongst ourselves, known as the "quarter-girth" method, as a catholic standard for ascertaining and comparing the size of trees. His paper divided itself into three heads. First, a statement of the method of ascertaining the cubical contents of timber now in use amongst us, in its relation to other methods and to accuracy; second, a consideration as to whether we are doing right in consistently making and employing this method for all purposes alike, commercial and non-commercial; third, a few practical points in regard to taking the dimensions of timber.

First, the method of measurement now in use in Great Britain is the mean quarter-girth. Take an example, a circular piece of deal representing the section of the middle of an ideal tree. It is 14 in. in diameter, its girth is 3 ft. 8 in., and consequently the quarter-girth is 11 in.; let the tree be 40 ft. in length, a reference to Hopper's tables gives us the contents at 83 ft. 7·4 in. But if a mathematical friend appeared on the scene he would say that that measurement was wide of the mark, adding, "Do you not know that the contents are equal to ·7854 of the square of the mean diameter, plus the height, or ·0796 of the square of the circumference, plus the height?" And on the same data by his method he would tell you that the contents of the tree were 43 ft. 4·10 in., or a third more than by the quarter-girth measurement. Having explained at some length the methods of measurement by assuming a tree to be a cylinder or cone, or truncated cone, Mr. Barry went on to say that experiments had been made on the Continent with the direct object of testing the value of the theoretical deductions arrived at by the cylinder or truncated cone method. The simplest of the experiments was the splitting of a tree into faggots of a certain length, which were measured separately and then added together, the sum of the contents being the total contents of the stem. Mr. Goursand constructed a table recording the results obtained in this manner from fifteen silver firs in the woods of Meyviat.

Diameter at 1·35m. from the ground.	Diameter in middle.	Diameter of Butt end obtained by tapes.	Height of timber.	True contents found by splitting into faggots.	Cylindrical contents by diameter in middle.	Truncated cone contents by means of 3 diameters.
0·299	0·178	0·238	16.	0·404	0·399	0·383
0·267	0·229	0·272	22.	0·808	0·907	0·719
0·286	0·239	0·294	15.	0·634	0·672	0·544
0·293	0·223	0·308	16.	0·612	0·624	0·588
0·312	0·261	0·318	24.	1·157	1·284	1·048
0·318	0·242	0·329	21.	0·919	0·965	0·927
0·344	0·261	0·353	25.	1·277	1·337	1·209
0·369	0·293	0·379	23.	1·414	1·549	1·307
0·382	0·280	0·397	22.	1·414	1·355	1·205
0·401	0·331	0·408	27.	2·095	2·323	1·781
0·414	0·312	0·422	28.	2·088	2·140	1·867
0·433	0·331	0·445	24.	1·906	2·065	1·772
0·490	0·331	0·519	26.	2·374	2·237	2·235
0·511	0·401	0·522	30.	3·732	3·790	2·977
0·630	0·439	0·654	25.	3·942	3·789	3·549
Totals				24·776	26·436	22·171

Now, the broad general result of the results brought out by this table are that, in spite of essential irregularities in a tree, as compared to a mathematical figure, the ordinary mathematical figure of assuming that a tree is a cylinder, and taking $\frac{1}{4}$ of the square of its mean diameter as the formula for ascertaining its contents, is not very far from the real truth. By the use of the formula we do indeed, as might have been expected, obtain a slight difference, but it is only a slight one, as compared with the results yielded by measuring it as a cone, and trifling as compared with the inaccuracy of the quarter-girth method. The difference is one on the side of excess, and this excess on the average amounts to only 2.6 per cent., which is as 1 to 1.04. The discrepancy yielded by the conical standard is on the side of deficiency, and amounts to no less than 10 per cent. In the experiments it came out as matter of fact that a tree is not a perfect cone or a truncated cone, but exhibited what architects in speaking of columns call an entasis, that is, a slight swelling out in the middle. A tree, in fact, says Mr. Gour-sand, may be likened to a cylinder for the major part of its length, and to a cone in its point. Another method of accurately ascertaining the dimensions of timber is by immersion in water, and measuring the quantity of water displaced. He ventured to recommend that in all systematic records of the dimensions of timber, whether for the individual's own pleasure or for authorized publication, the contents as yielded by what might be called the true mathematical method should be given, side by side, if you like, with those of the quarter-girth, but should at any rate be given. He was not so sure that even in commercial transactions it would do any harm to adopt it. The only difference would be that the prices would accommodate themselves to the altered standard. Mr. Barry illustrated his paper by models of cylinders and squares, and by an instrument for taking the diameters of trees.

The CHAIRMAN commented on the great value of the paper, and expressed a hope that it would be printed *in extenso* in the *Transactions*.

Mr. WILLIAM MCCORQUODALE formally moved that the paper be embodied in the *Transactions*, and corroborated the Chairman's remark, that it was one of the most valuable contributions ever made to the Society.

Mr. C. S. FRANCE said this was a question in regard to which foresters were generally pretty much at sea. The rough-and-ready method commonly employed for measuring trees had subsisted for so long that many thought it was perfectly correct, and never took the trouble of looking at the proper measurements. This was only another proof of the want of a School of Forestry, where such methods could be taught, and where they would have books on forestry published in other languages expounded to them. Mr. Barry's paper was of high educational value.

Mr. M. DUNN said that Mr. Barry had entered with great skill into this important matter, and had brought very valuable data before them. As an impartial judge he thought Mr. Barry had the best of the argument.

After some further discussion the thanks of the Society were awarded to Mr. Barry, and the paper ordered to be printed in the *Transactions*.

DETERIORATION OF SPRUCE.

Mr. C. S. FRANCE opened a general discussion on the deterioration of spruce in this country. There was, he said, apparently some peculiar change taking place in the health of the spruce plantations throughout the country. He had noticed in various parts of Scotland, and particularly in the island of Bute, spruces which had been in quite good health up to a recent date which were now browned to the very stem. Some said that this browning of the bole of the spruce was due to a peculiarity in late seasons, that the roots had been affected, and that this had brought about a vital change in the organs of the tree. It was a fact that the average rainfall of the last four or five years had been higher than during the previous twenty or twenty-five years. The spruce is a surface-rooting tree, and when once the subsoil gets thoroughly soured with the continuous rains the small spongioles of the roots begin to decay and unhealthiness of the plants ensues. This was indicated by the falling of the last year's smaller leaves. Then it might be seen that the inner branches were perfectly green and the outer leaves perfectly brown. The aphid gall had formed to an unusual degree on the points of the branches, though it might be that the general condition and health of the tree had induced the appearance of these insects.

Mr. McCORQUODALE did not altogether agree with Mr. France's theory of excessive rainfall as the principal cause of the disease in spruce. They knew very well that when planting land they generally put spruce into the moist parts of the new plantation. He attributed the appearance of the disease to high winds in spring and to winter frosts. At the same time severe cutting winds and severe frost are more trying to spruce in moist, humid ground than in a dry soil. But the peculiarity of the present disease was that spruce had suffered fully as much in dry sandy soils as in moist soils. He thought that cutting winds and frosts had done more injury to spruce than the rainfall. But of late the value of spruce had fallen so much that he often regretted that there was so much spruce timber in the country. During the Tay Bridge gale thousands and thousands of spruce trees were blown down. He had some 500, and timber merchants were not ashamed in offering a penny per cubic foot for it, while he was obliged to sell many of them at 3d. per foot. The timber of spruce was very valuable and deserved to be more appreciated than it was. It was much more valuable for some purposes even than Scots fir. Thirty-six years ago he had roofed stables and byres with spruce, and to-day these roofs were in a thorough state of durability and as hard as any timber. There was no timber in this country so suitable for stables and byres, or which stood the breath of cattle and horses so well as spruce.

Mr. BARRY said that if it could be proved that the deterioration of spruce was due to the wet seasons it would be in accordance with *a priori* reasoning. In Scandanavia, for instance, you noticed at once the change in the species of natural forest. On the side of the mountains exposed to the Atlantic winds and vapours you had no spruce, but Scots fir and birch, whereas the moment

the water-shed was crossed the spruce appeared. As a further proof of his theory he noticed that in some portions of Western Scandinavia, where there was a continental climate produced by local causes, there only continental plants were found—including the spruce in places sheltered from the moist Atlantic breezes. The spruce likes plenty of sun, but not an atmosphere saturated with moisture. If it could be proved that the deterioration of spruce had gone on with the deterioration of the climate it would therefore be in exact accordance with *a priori* reasoning. As to the value of spruce, he could say that when in Sweden he found spruce as much in demand as Scots fir.

Mr. DUNN was very strongly of opinion that the deterioration of the spruce was due to a combination of the causes referred to by Mr. France and Mr. McCorquodale. After the years 1876-7, some of the blasted trees got better, but others did not. It was the chilliness of the air and the soil combined that had produced the blasted appearance. Spruce was a light, sunshine-loving plant, and the warmer and drier seasons of 1868-69-70 did not bring on the blasted appearance. Where the blasted appearance occurs, it is in succession to ungenial weather, and in exposed places on moist, sour, stiff soils.

Mr. JAMES KAY, Bute, said that the spruces in the island of Bute had been browned within the last year; but he did not attribute the appearance to excessive rainfall or to wet ground. On the contrary, the spruce were browned during the time of the excessive drought last year.

Mr. DONALD MACKENZIE, Murthly, considered that frost was entirely the cause of the deterioration.

Mr. BARRY said it was perfectly possible that frosts at irregular seasons might be the cause.

Mr. FRANCE, in reply, said that the damp seasons had produced a condition of the plant which had made it more sympathetic to the influence of frost than if the season had been dry. They knew that in damp seasons plants grew vigorously, and if the wood was not properly ripened, no matter how hardy the plant might be in itself, it was sure to get nipped. As to Mr. Kay's remarks about the spruce in Bute, all he could say was that the trees there had the same appearance as elsewhere throughout the country, and it was perfectly natural for him to think that the same cause had been at work there as elsewhere. Mr. Barry's remarks had borne out his theory.

The CHAIRMAN, in closing the discussion, said that it was apparent that those who came to these meetings to be instructed would be amply rewarded, either by taking a part in these very instructive discussions, or in listening to them.

A vote of thanks to Dr. Cleghorn for presiding brought a very successful meeting to a close.

ANNUAL DINNER.

In the afternoon upwards of sixty members of the Society dined together in the Albert Hotel. Robert Hutchison, Esq., of Carlowrie, occupied the chair, supported by Sir Richard Temple, Bart., Professor Aitken, chemist to the Highland and Agricultural Society; Dr. Cleghorn, Mr. Sadler, Mr. J. W.

Barry, Mr. Gordon, Luss, Mr. C. S. France, Mr. M. Dunn. Messrs. Alex. Morrison, Elgin, and William McCorquodale, Scone, officiated as croupiers. The Chairman proposed success to the "Scottish Arboricultural Society," to which Sir Richard Temple replied, and in doing so he expressed his delight at all he had seen and heard that day. It had been a real pleasure to him to observe so many excellent essays sent in for competition, not only by foresters in Scotland, but in England, India, and the colonies. He hoped that on future occasions they should have many more contributions from Indian foresters, for of all foresters in the world none had more opportunities for adding to our arboricultural knowledge. Among the other toasts were "The Landed Proprietors" and the Chairman; "The Judges" and Mr. Dunn; "The Nurserymen" and Mr. Watts, Carlisle; "The Croupiers" and Mr. Morrison, Elgin; "Kindred Societies" and Professor Aitken, &c.; all of which were proposed in appropriate terms and warmly responded to. A most agreeable evening was spent with toast and song till towards eight o'clock, when the members proceeded to hear Sir Richard Temple's Lecture on the Forests of India.

SIR RICHARD TEMPLE ON THE FORESTS OF INDIA.

At eight o'clock Sir Richard Temple, Bart., K.C.S.I., delivered a lecture under the auspices of the Society, in the Freemasons' Hall, George Street, his subject being "Forests in India." There was a large attendance of ladies and gentlemen. R. Hutchison, Esq., of Carlisle, presided, and among others present were—Lord Arbuthnot, Sir Charles Aitchison, K.C.S.I.; General Benton, Colonel Dods, Dr. Cleghorn, Professor Dickson, Dr. George Smith, K.S.I.; Mr. Buchan, and Mr. Sadler.

SIR RICHARD TEMPLE having been introduced by the Chairman, began with a reference to the Society and its work, and to the importance of arboriculture as a scientific pursuit. Scotland, he said, was well advanced in that respect, the nobility of Scotland having led the van of practical improvement, while many eminent commoners had also done much to further the cause. Referring to the late Governor-General of Madras, he said that on no account was the death of Mr. Adam more lamentable than on that of forestry, because there was no part of India in which so much remained to be done in that respect as in the Madras Presidency, and there had been a hope that Mr. Adam would carry to Madras that practical knowledge which he had acquired on his own estate. It was to be hoped Mr. Grant Duff would follow the example his predecessor had begun to set. It was to be hoped a School of Forestry would soon be established in Great Britain, to send out skilled foresters for the improvement of the forests of India. An important and extensive public opinion was growing up, at least in North Britain, in favour of forestry in general, not only in Scotland, but in the Colonies, and especially in India. It was this public opinion which was wanted to stir up the minds of their legislators and statesmen in this most important matter. After referring to the extent to which the forests of India, which had at one time been almost co-extensive with the country itself, had been destroyed, he said they might ask how it came that he had such a sorry story to tell regarding the history of forest conservancy in India. He yielded to no man in the pride and satisfaction with which he looked

back upon the achievements of his countrymen in the East, and no man could have a more optimist estimation than he had—if they chose to call it so—of the condition and the progress of the Indian administration, but he was bound in honour and conscience to admit that in respect of forest conservancy they had lagged behind, and their failures and shortcomings in that respect constituted one of the few blots upon the past history of British rule in India. What was the cause of this? Why, it was simply ignorance—the want of instruction and education in those matters, and also the sluggishness of what was then an uninstructed public opinion. But this fault was now being remedied. Having next discussed at some length the effect of forests on the climatic and atmospheric conditions of a country, with special reference to India, the lecturer said that in India they saw the two things invariably linked together—on the one hand, disforestation and drought; on the other hand, forests and abundant rainfall. Having indicated the grounds upon which he urged that a proper system of forest conservancy in India was absolutely necessary, Sir Richard proceeded to ask to what extent that necessity had been properly recognised by the Government of India. There were now 25,000 square miles of forests in India that were properly preserved, and 50,000 square miles of forests which were imperfectly preserved—in all, 75,000 square miles. In Scotland they reckoned their forests by acres. British India had an area of 1,000,000 square miles. Therefore 75,000 square miles of forest represented just $7\frac{1}{2}$ per cent. of that area. Or if they chose to reckon only the 25,000 square miles that were properly preserved, that would give $2\frac{1}{2}$ per cent. of the total area. If they took it in acres according to the Scotch plan, they had 48,000,000 of acres preserved, perfectly and imperfectly together, of which 16,000,000 were, he ventured to say, perfectly preserved, even in the manner which would be approved by practical Scotch foresters. Let them compare this result with the result which had been mentioned with so much pride and satisfaction by Mr. Hutchison in some of the admirable addresses which he had delivered to the Society. He had made out that, though there had been a regrettable falling off in the forest area of Scotland, still as against 900,000 acres of forty or fifty years ago, they had 750,000 acres, or three-quarters of a million of acres under woods and forests. That gave just $3\frac{1}{2}$ per cent. upon the total of 20,000,000 of acres of area in Scotland altogether. So that, on the whole, India compared favourably with Scotland as regarded the total area of preservation, perfect and imperfect together, but compared unfavourably with Scotland in respect of the area of perfect preservation. The lecturer went on to describe the conservancy employed, which was of two kinds, general and special. With regard to what were called popular rights, he observed that under the present arrangements for forest conservancy, he believed the rights of the people were respected as much as reason and justice could properly require. With reference to the financial result, he said they would be happy to hear that the Government of India was deriving a considerable income from those forests. The gross proceeds amounted to £750,000 per annum, and the expenditure amounted to £500,000, giving a net return of £250,000 a

year. After mentioning the names of some of those whose labours had led to this satisfactory state of matters, Sir Richard concluded by observing that he was sure if by means of this Association, and by general agitation and advocacy, Scotland should succeed in placing forest conservancy in India on a sound moral basis, that basis which resulted from an enlightened public opinion, she would add one more leaf to that historical laurel wreath which encircled her brow.

On the motion of Sir Charles Aitchison a hearty vote of thanks was accorded Sir Richard Temple for his lecture.

VISIT OF FRENCH FOREST OFFICERS TO THE ENGLISH AND SCOTCH FORESTS.

A MOST interesting and instructive visit was made last month by three forest officers from Nancy to the forests in Scotland which belong to some of the great private owners, as well as to the Crown forests in England. The party consisted of M. Boppe, Inspector of Forests in the division of Nancy, M. Reuss, Assistant Professor of Forestry at the Forest School belonging to the French Government, and M. Bartet, Assistant Inspector under M. Boppe. They were accompanied by Colonel G. F. Pearson, attached to the Nancy Forest School, on the part of the British Government.

Their first visit on 13th September was to Scone, and the admirably-arranged woods of Lord Mansfield. Dr. Cleghorn kindly accompanied them there, and they were met by Mr. McCorquodale, and shown through the plantations. The great vigour of the growth of the oaks and magnificent young forest of the Douglas Pine, twenty acres in extent, which seems as if it promised to be "the tree of the future," for Scotland, was fully appreciated by the visitors. No less did they admire and appreciate the hale and hearty gentleman who, notwithstanding his years, was able to conduct them through forests of fine oaks which he had himself seen planted, and who may be justly called the father of Scotch foresters, Mr. McCorquodale.

From Scone they next visited, on the two following days, the larch and other fir forests belonging to the Duke of Athole, at Dunkeld and Blair Athole, going on the evening of Thursday, 15th, to Grantown. At both Dunkeld and Blair Athole Mr. Macgregor acted as a most able and courteous cicerone. In Strathspey two days were also fully occupied in studying the natural reproduction of larch and Scotch fir, as it has been successfully carried out by Mr. Thomson, the able manager of Lord Seafield. Here Lord Seafield himself, accompanied by the Hon. Mr. Bruce, met the party, and had much conversation with the French professors on the

question of forest management. Sunday was spent by the party at Rothiemurchus, the seat of Sir John Grant, K.C.B., who most hospitably entertained the foreigners, and where they were delighted on Saturday evening by seeing the national dances of Strathspey danced in the best Highland style in full costume; from thence they went to Forres, where the Culbin sands plantations afforded an interesting comparison with the *reboisements* of an exactly similar nature on the dunes of Gascony, between Bordeaux and Bayonne. From Forres also were visited the admirably-managed forests north of Inverness at Beaufort Castle, near Beaulieu, under the charge of Mr. Dewar, as well as the lovely valley of the Findhorn, and the extensive oak and pine plantations at Darnaway so successfully managed by Mr. Scott. The huge old ash and the big beech at Earlsmill also came in for a due meed of admiration from the foreigners. Fine weather during the whole of this time added to the pleasure of the visit, which was enhanced by the kind hospitality and courteous reception given them by the Scotch foresters, one and all, wherever they went. The remembrance of this will rest with them pleasantly for many a long day to come, and will form a theme of conversation in many a French forest.

After visiting Loch Ness, the Caledonian Canal, Oban, and Staffa, the visitors went to Edinburgh, where they inspected the Arboretum and Botanical Garden. They then went south to Windsor, where the park and forest were shown them by Mr. Simmonds, who most kindly and hospitably entertained them. Thence they visited the New Forest, and thence went by Salisbury and Bristol to the Forest of Dean. This most beautiful but little known forest, which has been admirably administered on behalf of the Crown by Sir James Campbell during the last twenty-seven years, was much admired by the French foresters for the good order in which they found it, as well as for the beauty of its scenery and the great vigour of the oak vegetation in it.

It would be premature here to make any observations of a critical nature regarding the many forests that were visited. The visit was one, suffice it to say, full of pleasurable recollections to those who made it.

With regard to the possibility of forming a School of Forestry in Great Britain, their opinion appeared to be that, generally speaking, it would be perfectly feasible in due course of time, provided that certain tracts of forest could be made available, free of interfering rights, to be subjected to a systematic management, with a view to their being utilized for instruction.

SURFACE DRAINAGE.

CHANGE of climate is a very customary remark among our country brethren. We hear it told that the summers now are not near so long nor so hot as they used to be, and also the winters are not what they were during the juvenility of that infallible authority "the oldest inhabitant." It is even said crops do not grow so well as they used formerly. All this sad state of affairs is set down to change of climate. If, however, we pause and examine the statements of these assertionists we will find that the sun continues tracing out his usual course, returning to us our ordinary quota of spring, summer, autumn, and winter. That much-abused Clerk of the Weather never retaliates with perceptible change of tactics. It is true natural agencies may at times send a nice-floe across the Gulf Stream, and acting for the time being as a natural refrigerator, send a cold current over our country; but this is accident—nothing permanent. Taken on the aggregate, is there sufficient data on which to base the assertion—change of climate? Rain, we are told, comes from the sea. Some minute observers have even discovered saline particles after heavy showers, not to speak of fish and other salt-water creatures. But apart from the vagaries of our climate, what is the theory of rain? It is simply heat, cold, and moisture. The rays of the sun, warming the surface of the earth, cause the moisture contained therein to evaporate. This moisture floats through the air as a highly rarified vapour. As the sun towards evening loses its heat the vapour becomes more condensed, and falls upon the earth as dew. When evaporation has been for a time continuous, the air is surcharged with vapour, the temperature quickly cools, and the clouds become watery, which falls as rain. Rain is only moisture evaporated by the sun from the earth, returning again by a cooling of the atmosphere. The vapour, condensed as rain, receives the elements of excellent fertilizers, so that all the rain which falls upon the surface of a field never injures the ground. The necessity, then, for thorough drainage is not because of the rain which falls upon our fields from the clouds, but is entirely due to other causes or combination of causes.

As I stated under this heading last month (page 439), wetness of the land may be owing to one or other of the causes I then mentioned. It frequently happens that land is wet although naturally dry. This is owing to its situation. When a field is situated at the base of higher ground it is often kept wet owing to water oozing out and lodging on its surface. In course of time the soil becomes soft and boggy. In other instances land is rendered unfit for cultivation owing to water rising to the surface from springs beneath. This is the most injurious. To remove the injury thorough drainage must be resorted to. No work connected with estate management is more

important or more interesting than draining. Indeed, a very small degree of observation is necessary to convince every one of the bad effect a superabundance of water has upon vegetation, and any ground incapable of being dried is incapable of being improved. The benefits resulting from thorough drainage are so palpable that every farmer having ground naturally wet will find it to be his interest to make draining precede all other improvements. It is at all times a costly operation; and the chagrin of the farmer may be better imagined than described when he finds, after having spent some six or eight pounds per acre on drainage, his field is but imperfectly dried. This is in no way illusionary; it too often happens. When extensive thorough drainage is contemplated, a Government loan is usually taken to carry on the work with. When such a loan is applied for, an inspector is sent down by the Board of Public Works to draw out a plan, and this plan with specifications is forwarded to the borrower. The execution of the work must be carried out in strict accordance with the instructions of the inspector. The system is well-intentioned, but often proves a failure as far as thorough draining is concerned. The theory of drainage is so intimately connected with the nature of the subsoil and understrata that the work should only be intrusted to a person possessing a competent knowledge of the district and its various strata. I am doubtful if any inspector of drainage, however competent he may be as a practical drainer, can, from a single visit, lay down specific rules for thorough drainage, as the most experienced will find, during the course of the operation, that local variation will be occasioned by particular circumstances which cannot be ignored. He should have the practical superintendence of the work; then he, as the work proceeds, will be able to compare and ascertain to what degree each stratum stands pervious or impervious to water.

It is necessary to have some preconceived plan, but this can be varied to suit circumstances. Thorough drainage is the *sine qua non* of good husbandry, and must, *per se*, be thoroughly understood. An essential principle in draining is levelling, or ascertaining correct falls; there are many costly, complicated instruments invented for this purpose, but instruments need only be used where there is a doubt, or when the ground is to all intents and purposes level. An eye well trained to accuracy is as necessary as a costly instrument. Every expert drainer knows that it is in the bottom of the drain he must keep an uniform fall, irrespective of the surface. Where the ground is very flat the great difficulty is getting a proper fall for the main drain. A fall can be made in the opening of submains and minors. If, for instance, the main is 4 ft. deep a fall of 1 in 300 ft. can be made in minors by making them 4 ft. at the one end and 3 ft. at the other. It

used to be a very common practice to cut all the drains 4 ft. deep and 40 ft. apart, on the principle of 1 ft. deep for 10 ft. apart. But in many cases this was a costly system, as the ground had to be re-drained. The depth of the drains and their distance apart depend entirely on the nature of the soil. When free and open the drains may be wide apart, but where the subsoil is retentive they should never exceed 3 ft. in depth nor 20 ft. apart.

There are different sorts of drains in use, but I will only enumerate those that have come under my own experience. When stones can be got conveniently I prefer them, except in cases about to be mentioned. In placing the stones in the bottom I prefer having the first stones set in a triangular form, well packed at the sides and on the top to a depth of not less than 15 or 18 in., of course the depth of stones will depend on the nature of the drain, but no man will regret putting plenty into the bottom. The smallest sized stones should be evenly spread uppermost. Above the stones a sod should be put, grassy side downwards; then the earth firmly tramped to close up the whole. I prefer to begin the stones at the end of the drain, finishing at the submain. This system of drain answers very well when fine flat stones can be got reasonably convenient. When the stones are large, angular, or roundish, such as form the bed of a river, I prefer to put the first stone perpendicular against one side of the drain, and lay the next slightly sloping against it, packing as before. Unless horsework is very high the cost of either of the above methods will run about 1s. 10d. per perch of 7 yards. If tiles are used I will take the responsibility of warning all against anything under 1½ in. bore. When drains are opened for pipes they ought to be cut very narrow at the bottom, and above all, even, so that the pipes will rest solid. No pipes ought to be put into soft bottoms, otherwise they get deranged, quickly rendering the drain useless. It is a capital plan to put 8 or 10 inches of broken stones above the tiles. The stones may be broken to about the size of hens' eggs. Many object to stones being placed with tiles, but if by using both it does not increase the expense too much, none will regret the labour. I always advocate using pipes on very flat ground with unsatisfactory fall. The utmost care ought to be taken in laying tiles not to put in a broken one, and to see that they are solidly laid on the bottom. If the bottom is soft, or if there is any danger of the tiles sinking, soles of wood not less than 18 ft. in length should be laid under the pipes. I have no hesitation in condemning the soles made of clay, and sold for the purpose of putting below the tiles; they are too insignificant, and as likely to sink as the tiles. Timber is objected to because—as the objectors say—it will ultimately rot away from under the tiles. But it will last as long as the drain will remain effective. In fact no one can tell how long timber will last when buried in bog. Broken

stone drains are greatly advocated by efficient drainers. This is simply to reduce the stones to about the size of road metal, and to fill up the bottom, of the drain with them. In certain subsoils they suit very well, but from experience I have found them the worst class of stone drains; and I never would use them on flat ground or where the water is impregnated with iron ore. As far as I have yet seen they do not succeed well anywhere, unless on a very hard subsoil. On hard clean subsoil, and when plenty of stones are put evenly into the bottom, they make a good serviceable drain. In bog or sandy clay they, in my opinion, are most objectionable.

Sod drains are old-fashioned, but, nevertheless, not to be despised. I have in course of drainage operations met with this kind of drain acting as well as could be desired, and when I state that they must have been over one hundred years made, it will not detract from their favour. I have made a considerable number of sod drains, and they have proved highly satisfactory. My method of cutting sod is to line off both sides of the intended drain, then two men with spades cut opposite each other, making the sod saddle-backed, or thick in the middle. The sod need not be long, a foot or so in length is quite enough. Lay them carefully aside, then open the drain in the usual way, thirty inches or three feet deep. Clean the bottom of all loose earth before sinking deeper. Afterwards cut out the centre ten inches deep, leaving two offsets, one on each side, as shoulders for the sods to rest upon. The sods are then, green side downwards, rammed down as hard as possible until they rest upon the offsets, and arch over the cavity below. This is a surprisingly durable method of draining where the subsoil is a tenacious clay. They answer extremely well in districts where other materials are scarce, and they can be made at one-half the expense of stone drains.

Straw, brush, and other antiquated methods of draining, I have had no experience of, and cannot enter upon their merits. As far as my experience goes, nothing exceeds good stone drains; and having re-drained some extensive farms, I may be permitted to state that the great error in draining is bad local superintendence. Every stone, tile, or whatever is used in the bottom, ought to be laid before the eyes of the person intrusted with the work. It is also imperative that none but competent men be employed to oversee drainage. The work being always expensive is rendered doubly so when imperfectly performed. The benefit resulting from a system of thorough drainage, is too well known to require further comment. In a future paper I shall further discuss this highly important subject.

D. SYM SCOTT.

PINUS AUSTRIACA AS A SEASIDE PLANT.

THE Black Austrian Pine is one that deserves more attention from arboriculturists than it has hitherto received. In a former number of this *Journal* (Vol. iii., p. 165) I drew attention to this tree as having been planted for shelter along the sea-coast upon an estate in County Down. From observations made since then in different parts of the country I am led to believe that the Austrian Pine is one of the best of the coniferous tribe of plants, both for shelter upon the coast and also for general hardiness.

The *Pinus Austriaca* is very accommodating in regard to soil. I have found that it will grow well in almost any kind, provided that it is not too damp. Certainly, like all trees of the coniferous tribe, it prefers a moderately light soil; but under any ordinary circumstances it will succeed upon soils and situations in which many other trees would utterly fail.

Being of a strong and robust nature and habit of growth, this tree is peculiarly well adapted for growing in exposed places along the sea-coast, and in many similar situations where shelter is desired from the stormy winds which often prevail in many parts of the country. When planted in these situations it forms a dense bushy tree, which not only serves the purpose of shelter to others behind it, but at the same time becomes a highly ornamental plant, with its dark green leaves and strong, robust appearance. In fact, I have seen many a bleak, cheerless coast rendered highly ornamental and attractive by planting *Austriacas* upon it. They form a fine contrast among other trees, and look well when planted upon bold, prominent points along the coast, where, when well advanced in growth, they can be seen to advantage at a great distance.

When planted along the coast, where I saw them, they had received no protection whatever, but were put in in the most exposed places, and left to make the best progress they could under the circumstances. The result has been something wonderful. Certainly a few of the plants perished at an early stage of their existence, but when taken as a whole it may be said that the experiment has proved a success.

In planting along the sea-coast, or in other exposed situations where shelter is the chief object, the plants of the *Pinus Austriaca* should be selected all of a strong, healthy nature. They should be robust, and in no way inclined to be "drawn up." In fact, plants intended to be put permanently in the places I have mentioned should receive a special course of training in the nursery. They should be reared at wide distances apart, and frequently transplanted thereby ensuring strong, robust plants with good fibrous roots attached. When removed to their permanent sites, they may be planted about

3 ft. apart, and in pits prepared for them previously. If the soil is of a very poor or uncongenial nature, some prepared soil may advantageously be put in the pits and round the roots of the plants, as this will materially help them to future success. After being firmly planted upon their sites, those on the most exposed parts ought to be staked until they get fully established in the ground.

I am of opinion that upon the outside of the plantation the *Austriacas* should not be intermixed with any other kind of tree, but should be planted in a mass by themselves. I have frequently observed that they succeed best when planted in this way, and certainly they afford more shelter to the other trees behind. This will depend, however, upon the nature of the coast line, as in those lower-lying places, where the sea breeze does not take so much effect, other trees of a kind suitable to the sea-coast may well be mixed with the pines. This, and the distance from the sea at which the pines should be planted by themselves, will greatly depend upon the situation and nature of the exposure.

A great deal of the after success of the trees planted in the way I have mentioned will, of course, depend upon the way in which they are looked after and attended to in the way of thinning. The pines ought never to be allowed to become too close and drawn up, as they will assuredly then become useless as shelter, and ultimately get blown over. By keeping them moderately thin and of a bushy nature they will be sure to succeed well, and serve the purpose for which they were intended, which in such a situation as I have imagined would, of course, be more as a means of shelter than as timber trees.

To those of the readers of this *Journal* who have to do with sea-side plantations I would recommend this pine as one which will under fair treatment stand the severest blasts that are common on our coasts. To those who are sceptical as to its adaptability in such places I would respectfully say, "Give it a fair trial, and note the results."

GEORGE E. BROWN.



THE HOME FARM IN NOVEMBER.

SOWING.—Wheat sowing should be finished by the middle of the month, upon all except the driest and lightest soils. With the advance of the season the quantity of seed per acre must be increased. Clover leys should be pressed or well trodden down to insure that firmness of seed-bed so necessary for the wheat. Where the land remains too loose, or "hover," as it is sometimes called, the young plants are apt to be frozen out during a severe winter.

Continue to plough or scarify and clean *arable land*, as the season permits. Fields intended for spring corn are better scarified early, and ploughed later on. But a deep ploughing may at once be given for carrots, potatoes, mangolds, and turnips. Cart on chalk and marl, and upon the heavy soils long manure. Upon porous soils the manures are better applied immediately before the crops are put in.

Hop Gardens should now be cleared of bine and old poles, and manures may be carted on in dry or frosty weather. Upon heavy soils dig in woollen rags and long manures at once. Cart on new poles. Plant up dead hills, using bedded sets from the nursery. As poles are cut or brought in, shave and sharpen these, and either bed them up carefully and cover for summer dipping, or creosote and carry on to the ground at once.

Root Crops.—Mangolds should already be clamped. Increase the thickness of soil before sharp frosts come. Cart and stack swedes, turnips, and kohl rabi for use in the yards. Draw carrots, and clamp and cover lightly until the sweating period has passed.

Live Stock.—November should be a busy time with the farm horses—root carrying, manure carrying, and ploughing. Fattening bullocks should have cake and dry food, and be kept off the pastures in frosty weather. Fold all young stock by night. Liberal feeding should be the rule with all stock intended for early marketing.

Hedges should now be dug round or well hoed and cleaned, dead ones grubbed and replanted, and all gaps may be filled up with hawthorn, beech, or myrobalana, according to soil and situation.

The *irrigation* of meadow lands should now commence. A regular turning on and off according to the supply of water and the weather is desirable, and in dry weather a heavy roller may occasionally be used.

As the pastures become bare, *dairy cows* must be more liberally fed in the stalls. The last cut of comfrey will still be available, and this should be supplemented with hay, and perhaps a few roots.

Estate Work.—Carting trees to the planters, leaves to the rot-heap, compost to nursery grounds and to poor planting sites, fuel to the mansion, and all materials for roads, drainage, fencing, &c., as required.

A. J. B.





ENGLAND.

PLANTING must still be the first consideration, and while open weather lasts all other operations should give way to this or be looked upon as of secondary importance. Deciduous trees of all kinds are commonly considered unfit for removal until they have parted with their leaves. An old distich says :

“ He that would a good tree have,
Must bury the old leaves in its grave.”

But the advantages of early removal, while the soil is warm, and a sufficient store of sap to force on the young rootlets remains in the plant, more than counterbalance any losses. Plant up all dry quarters, and drain and trench or pit the more retentive land.

The felling of underwood will commence during this month, and too much care in the cutting cannot be taken. The smaller stools, especially, should be carefully handled and cut with light tools. A clean-cut and well-rounded stool should be insisted on. No cutting in frosty weather should proceed. As the dormant buds proceed directly from the medullary rays or processes, their development depends upon the adherence of the bark to the wood. And the production of adventitious buds takes place only when at the point of severance from the stool, the coherence of bark and wood are thoroughly maintained. Low cutting favours the growth from dormant buds close to the surface of the ground, and thus the stool is at once increased and strengthened.

To give every facility for early removal, well-brushed roads should be laid out at convenient distances in the absence of hard or metalled roads. Roads sufficiently sound to carry the produce of the falls over any but the very wettest land may be made by laying down transversely to the line of traffic about forty good brush faggots to the rod, and covering the centre of the track lightly with good burnt ballast, rough turves, or even clayey soil. Many permanent roads are bottomed with faggots or bavins, but the practice is not to be recommended, as the wood soon decays and the roads become rotten.

Continue to collect tree seeds and to sow such as are not liable to injury from early spring frosts. The haws, yew, and holly berries may be consigned to the rot-heap. Such as have already been in pre-

paration in the rot-heap may be either sown now or kept over till spring. Collect the cones of Scotch pine, spruce, and larch. No seeds of any kind should be stowed away for the winter until they have been thoroughly dried in an airy situation.

The present is a favourable time for grubbing old hedges, or plashing, ribbing-in, or close switching such as have become too spreading. Where the situation is very exposed, these latter operations may answer better if performed early in the spring.

Where plantations require a light thinning this may be given them at once; but where a heavy thinning is contemplated it may be done later on. Stools that are expected to be reproductive should be carefully rounded off after the manner of coppice stools.

All ditches and watercourses should be well brushed and scoured out, and pinnocks should be kept in good order. Examine the mouths of closed drains, and cut away any roots likely to penetrate these. Open out fresh drainage wherever needed. Timber of the best quality can be grown only upon fairly dry land.

Collect all scourings of ditches, leaves, and other refuse for the formation of compost heaps. The richest composts are produced by the addition of calcareous substances, old mortar, marl, shellsand, or hassocky limestone. These, with an addition of fermenting manure, will prove to be invaluable either to the tree planter or the gardener. An occasional watering of the whole mass from the liquid manure tank will greatly increase its value.

Wet lands intended for spring planting should first be well drained, and then either steam cultivated, trenched, or pitted, as may be considered advisable.

Pluckley, Kent.

A. J. BURROWS.

SCOTLAND.

DURING favourable weather, general planting operations should now be pushed forward. In all dry situations autumn or early winter planting is much preferable to spring planting, and should, if possible, be adopted. Avoid using large plants in exposed situations, as they are apt to be driven about and much injured by strong winds. The plants should be carefully lifted in the nursery, so as not to injure the roots, and also carefully and firmly inserted in the plantation ground.

Plant, trim, and repair hedges, using beech or holly under the shade of trees, and keep all plantation fences and gates in good order.

Continue the felling and thinning of fir and pine plantations. Thin hardwood plantations and hedgerows. Dispose of lots of birchwood, and deliver as required or agreed. Dig or trench nursery-ground as it

becomes vacant, as recommended last month. Collect leaves, and cart them, road clearings, and other refuse into the rot-heap.

Metal, gravel and repair roads, drives and walks, and continue general ground improvements.

Darnaway, N.B.

D. SCOTT.

IRELAND.

FOR eight consecutive days a perfect hurricane swept across this country, inflicting much damage among trees. Many a noble specimen is sadly disfigured in parks, on roadsides, and in forest. Everywhere torn and broken branches are tossed about, some wrenched completely off, others splintered, and are hanging down. No time should be lost in pruning off all injured branches. The greatest care must be taken to guard against leaving cavities for the lodgment of water in any of the wounds. Unless this is attended to rot will soon set in and destroy the tree. All recently-planted trees should be examined, as in all probability they will require some readjustment after the severe gale. Planting should now be general, and nothing should interfere with its advancement, as the end of the month ought to see the winding up of autumn planting. Attend to instructions on this subject last month. Leaves are falling fast now; see that they do not accumulate in open drains or watercourses. If neglected, much injury may be done to roads and bridges. Alterations on the farm may now be begun. Fencing, draining, and roadmaking will all succeed the work of planting.

Ballinacourte, Tipperury.

D. SYM SCOTT.

WALES.

As recommended last month, continue the fencing and preparing of ground for planting. As the present month is a good time for planting young trees, the work should be pushed forward as fast as possible before severe weather sets in. In exceptional cases, such as where the ground is much exposed, or of a stiff nature, and only recently drained, planting may be advantageously deferred until spring.

The general thinning of plantations of all ages, irrespective of kinds, may now be proceeded with. Hedgerow timber may also now be cut down, and removed as soon as possible during dry weather, and while the ground is firm.

Attend to all fences, tree-guards and rabbit-proof netting; also continue the planting of young thorn hedges on properly trenched and prepared ground. Adjust the stays or moorings of large transplanted trees, that may have been damaged by the wind.

Continue the formation of new roads, levelling, &c., and have material prepared for the repairing of roads, drives, walks, &c.

Young stock may now be transplanted in the nursery, and in removing and lifting plants, the ground should be turned up to as great a depth as possible, and left in a rough state to receive the benefit of the winter's frost, &c.

Kimmel Park.

LEWIS BAYNE.

OCTOBER.

(Written for the Journal of Forestry.)

OCTOBER ! October ! I sing of thy praise,
A song of bright woodlands, and beautiful lawns ;
Of calm, mellow mornings and halcyon days,
Of gay-tinted sunsets and gossamer dawns.

I sing of thy hill-sides, all purple and green ;
Thy moorlands and forests, so richly arrayed,
Whose exquisite blendings of colour I ween
Were never by human skill limned or portrayed.

The lime-trees looked scorched, where the sun's dying rays
Have lingered too long ere he sank to repose ;
And the hedgerows and orchards are all in a blaze
With shadings of amber, and crimson, and rose.

Here wine-tinted stems of the cornel uprising,
And bramble-leaves dipped in ensanguined red,
While graceful laburnum looks down in surprise
At her boughs all abloom, though her blossoms are dead.

The heavy old chestnuts stand sheeted in gold,
And poplars aglow with a marvellous sheen,
While sturdy-limbed sycamores, wrinkled and old,
Shake down all their spotted leaves over the green.

October, no breathings of summer are thine,
No fragrance of hawthorn, of myrtle or bay ;
But thy landscapes are swept with a charm that's divine,
And the death-tints of autumn are dearer than thine.

KATHERINE KAY.

THE GREAT GALE OF OCTOBER 14, 1881.

ITS EFFECTS ON TREES AND PLANTATIONS.

ENGLAND.

BERKSHIRE—Windsor Parks and Woods.—The gale of the 14th October in this district appeared to blow in gusts or drifts, selecting in its course, here and there, a tree practically in a straight line from south-west by west to south-east. The oldest trees have, as a rule, suffered most, particularly the beech and elm; the pollarded oaks too, near Forest Gate, which are known as the veterans of the forest, and are supposed to be 500 to 800 years old, have been much broken in the heads, and the old thorn trees in the Great Park are blown down in all directions. The storm was extremely boisterous in the valley of the Thames, and many of the fine old elm and lime trees forming the avenues on the low-lying ground near the river, in the private part of the home park, have been torn down by the wind. In one instance four fine elm trees, standing side by side in an avenue, fell together. The return herewith enclosed gives the number of trees blown down and seriously damaged. It is impossible in the short time allowed for getting information for this memorandum to estimate with even approximate accuracy the value of the trees uprooted by the gale. The wood in most cases is only fit for firewood, and the market is already overstocked with that class of firing. No doubt, however, the sum of £500 at least could be realized, taking the valuation at a very low rate. The old beech, thorn, birch, and elm have suffered most, as already stated. It would be misleading to give the average age of the trees, as the thorns and beech are very old. The young plantations up to sixty years' growth have been damaged very little, owing no doubt to the careful treatment and thinning practised here for many years past. In the Long Walk only one elm was blown down, but most of the trees have lost branches, and a leader now and again.

A statement of trees blown down and damaged by the gale on the 14th October. The damaged trees have lost their leaders, or are otherwise severely injured. An immense number of boughs have been broken from trees not included in this statement:—

English oaks	...	...	...	659	Mountain ash	...	...	...	1
Beech	...	...	...	256	Ash	...	...	...	22
Chestnut	...	...	...	56	Aspen	...	...	...	9
Birch	...	...	...	169	Hornbeam	...	...	...	5
Plane	...	...	...	4	Acacia	...	...	...	4
Elm	...	...	...	234	Lime	...	...	...	11
Holly	...	...	...	4	Turkey oak	...	...	...	36
Firs	...	...	...	358	Scarlet oak	...	...	...	5
Horse chestnut	...	...	...	6	Evergreen oak	...	...	...	1
Larch	...	...	...	32	Crab	...	...	...	5
Thorns	...	...	...	119	Walnut	...	...	...	1
Yews	...	...	...	1					
Maple	...	...	...	9	Total	...	...	...	2,008

ABSTRACT.

Total number of trees blown down	...	...	...	961
" " damaged	...	...	...	1,047
				<u>2,008</u>

BEDFORDSHIRE—Biggleswade.—Mr. Allis, Old Warden, writes to the *Journal of Horticulture*:—"The gale was severely felt here, uprooting several fine trees of oak, elm, cedar, and arbor-vitæ in the pleasure-grounds, and the damage done to the trees in the park has made it a scene of desolation from every point of

view. Large branches of oaks and elms have been torn off by the fury of the gale like matchwood. On a neighbouring estate a large cedar of Lebanon has been blown on the conservatory adjoining the mansion, doing considerable damage to the mansion as well as the conservatory."

Woburn.—The Duke of Bedford's park has suffered severely, hundreds of trees having been torn up by the roots.

Bucks—Eton.—In the gale one or two of the fine old elms in the playing-fields at Eton, which were planted by Provost Rouse, sometime Speaker of the House of Commons, and the man by whose influence, as it is said, Cromwell was induced to spare Eton from spoliation, were blown down.

Langley.—There has been a very great destruction of timber on the estates of Sir R. B. Harvey, M.P., and a correspondent of a daily contemporary states that "the woods look as though they had been subjected to a heavy artillery fire."

Mentmore.—The gale was most severe here; from fifty to sixty large trees were blown down, mostly elms. One very handsome specimen, a small-leaved maple, was ruined, its head was torn off, and the stem split to the ground, so that it had to be grubbed up. The roads were impassable for hours, owing to so many limbs and branches of trees being blown down. No such hurricane has been known in this part of the country for many years. Young plantations have escaped without much damage being done. The trees blown down would vary in value from 30s. to 100s. each.—J. SMITH.

Dorsetshire—Milton Abbey, Blandford.—The gale that passed over this locality left behind it ample proof to testify its severity, and its disastrous effect upon the ornamental and park trees is very considerable. A great many of the fine old specimens of English elms and Spanish chestnuts that beautify our parks and hedgerows are fearfully disfigured, and must either be cut down or stand an object of pity; the dreadful havoc done to the wire fences, corn ricks, &c., can be in a measure remedied, but the fine old park trees, with their shattered trunks and huge limbs lying scattered on the ground, cannot be replaced. In the plantations here the number of trees blown down is not so great as the destruction done to the heads of the oak, ash, elm, beech, &c., especially those that have what is termed a double top, i.e., where the trunk breaks into two heads at one point, a positive proof that too much care and attention cannot be given to all young plantations in pruning and foreshortening all such trees as have a tendency to become double-headed.—W. WATSON.

Durham—Gateshead.—At the outskirts of the town, trees, palings, and hedges suffered from the high wind, and in the Rector's Lane, Bensham, one of the few fine old trees at the rear of Professor Ede's residence was snapped in two during the afternoon. The total damage done in Gateshead cannot be estimated, but it has been considerable.

Gloucestershire—Forest of Dean and the Highmeadow Estate, belonging to the Crown.—Damage done by gale of October 14th comparatively small. In Dean Forest one large oak tree, about 220 years old, broken off about halfway up, being decayed; also two large beech trees of about the same age. Comparatively few oaks are uprooted in the plantations, but some hundreds at least are considerably damaged and broken, chiefly in Stapledge and Cockshoot Plantations, planted in 1814 and 1815 respectively; also a few hollies and thorns broken down or uprooted; but on the whole, considering the extent, some 13,000 to 14,000 acres, not much damage has been done. On the Highmeadow Estate there is much the same kind of injury done, in broken branches and tops, but not a great deal. The worst is in Doward Wood, which has been thinned during the year, and where some trees of various sizes have been broken or uprooted. I am unable as yet to estimate the amount of damage in money value.—J. CAMPBELL, Deputy Surveyor.

Woodchester Park, Stonehouse.—I send you the report of the late gale received from my woodman, just as he has given it to me; I hope it may be useful to you. Trees uprooted 15, value £27 18s. The elm was the tree which suffered the most, and eight of them are down. Damage to plantations £20. Branches broken 75, estimated damage £18 15s.—W. LEIGH.

HAMPSHIRE—*District of Fareham*.—The gale was very severe, but the ground being dry and firm more damage was done by breakage of the head and branches than by uprooting of the trees. We have ten good old trees blown down, mostly decayed in the roots, value about £20. Oak, ash, and elm have suffered most. The greatest damage is in the oak woods, and especially those where the underwood was cut last winter. Many fine trees have their heads split in two, and others with scarcely a sound branch left, the branches being broken and twisted in all directions. The storm points to the great necessity of choosing only those trees that have well-formed and evenly-balanced heads when thinning, and the need of pruning to secure single leaders, as the greatest damage is on trees of a forked growth.

Farnborough.—A large number of fine trees in the park belonging to the Empress Eugénie, as also in Farnborough Park (Captain Elliott's), were torn down. At Bagshot Park, the residence of H.R.H. the Duke of Connaught, stately elms and other trees were uprooted by the score.

The New Forest.—The recent gale has, I am glad to say, not affected the New Forest so severely as might have been feared. A considerable number of decayed beeches and some oaks are blown down, as must have been expected, but the damage does not exceed the wind falls of an ordinary winter. A few good growing oaks are blown, where their hold of the ground was weakened by adjacent drains, &c. In Alice Holt a great number of branches of the growing oaks are torn, and twisted, and broken. There is considerable damage done here, but nothing to compare with that caused by the snowstorm of October 20th, 1880. In Bere Forest but two trees are blown down, but a good many branches and tops are broken. In Woolmer only a few fir trees (Scotch), and about ten oaks are blown down—small ones. Upon the whole I consider that we have escaped fairly well, as although the number of windfalls is great on this large district, yet the trees that are blown down are mostly decayed, and of little commercial value. No very remarkable trees are lost, except an ancient ash in Ashurst Wood, and at Bere a notable old poplar close to West Lodge—GERALD LASCELLES, Deputy Surveyor.

HEREFORDSHIRE.—A gale of terrific violence swept over this county on Friday, the 14th October. Sad havoc has been wrought in our fine old Castle Green Walks; the row of fine old elms have suffered much. All over and round the city trees of all kinds have been destroyed. In the neighbourhood of Leominster Croft, Kinlet, Bodenham, Jugwardine, Holme Lacey, and Whitfield, trees and plantations have been snapped up like matchwood, and damaged to the estimated extent of many thousand pounds. I think the elm trees have suffered the most.—F. H. MERRICK.

HERTFORDSHIRE—*Tring*.—Messrs. Brown & Foulkes write :—The storm of the 14th October, within a radius of ten miles of Tring, will be remembered as the most disastrous that has occurred during the present century. The damage to forest trees was very great. Woods recently thinned and exposed to the full force of the wind felt it most. In one large wood a whole drift of beech were uprooted, and hardly a single wood escaped damage. Plantations were not injured so much as beech woods, the weight of the foliage of beech, oak, and elm being of great assistance in their destruction. Numerous hedgerow elms have suffered, in many cases doing damage in the fall. Some men were in the act of clearing the road of some elms near Tring, when another tree fell and killed one of the men on the spot. In Tring Park nearly one hundred trees of all sizes, but mostly beech, were torn up, in some instances several tons of earth being lifted with the roots. In Ashridge Park nearly two hundred trees were blown down or robbed of large branches. Many of the taller trees, such as poplar, were generally snapped off ten or twenty feet from the ground, but very large old trees were split down or only lost some of the limbs. All woods will require careful examination during the next few months, as there are a great number of trees so blown out of the perpendicular that it will be useless to allow them to remain.

LANCASHIRE—*Liverpool*.—Mr. W. Bardney, Norris Green, writes to the *Journal of Horticulture* :—"A terrific storm of wind, sleet, and rain was witnessed in this neighbourhood. The damage done in the gardens is considerable, the majority of the trees being broken and dashed considerably, while seven or eight were entirely uprooted. One fine old elm, which had an immense

symmetrical head and its lower branches sweeping the ground, was torn up with fully two tons of soil to the roots."

Rufford Hall, Ormskirk.—The storm has done considerable damage on this estate amongst the timber, which cannot be estimated at the present time. It blew down ten elm trees in the park averaging 70 cubic feet each, two oaks averaging 30 ft. each, and several very old willows are damaged, and will have to be taken down. The elms, which are about ninety to a hundred years old, have suffered most. There has not been a storm that did such damage amongst the timber since September, 1875.—THOMAS OGILVY.

Wyreside.—No damage worthy of particular note has been done in this neighbourhood, nor have I learnt of any damage resulting from the storm in any part of North-west Lancashire. The wind was certainly high, but not of uncommon severity, and decidedly nothing approaching to what it was in other quarters.—ANDREW SLATER, JUN.

LINCOLNSHIRE.—*Stamford*—Many will regret to hear of the accident which befell Queen Elizabeth's lime tree during the late violent gale. The trunk was divided into four parts about seven feet from the ground, each one as large as an ordinary tree; three of these were blown off, taking part of the trunk with them, leaving only the smallest one and a few small branches remaining. The trunk measured 22 ft. 6 in. in circumference at three feet from the ground; it is much decayed in some places, and has been well supported by props and chains for several years. It was planted by "Good Queen Bess" during one of her visits to Burghley, and is, therefore, nearly 300 years old.—*Gardener's Chronicle*.

MIDDLESEX.—*London.*—In all parts of the metropolis the gale raged for two or three hours in the middle of the day with almost unprecedented violence, and in many of the more exposed suburbs the damage done by falling chimneys, slates, and tiles was very considerable. We have not heard of any well-known "London trees" having succumbed, but in several of the parks in and around London there was much damage done to the trees. In *Kensington Gardens* several large elms were uprooted, and near Speke's monument a group of fine young planes, about a foot in diameter, were prostrated. In *St. James's Park* several old elms came to grief, one of which was unfortunately the cause of the death of a young child, the daughter of a gentleman living in Pall Mall Place. Further away from London, in the *Royal Gardens, Kew*, as well as in the Arboretum, an immense amount of damage has been done. Some very fine trees were uprooted, notably two large elms that stood close to the roadway in front of the Herbarium, besides other elms in other parts of the grounds. One fine tree of *Mespilus grandiflora* was thrown down, and the large paper mulberry tree (*Broussonetia papyrifera*) on the lawn near the Succulent House was snapped off at about a foot from the ground. Horse chestnuts and willows suffered severe damage. So general indeed was the devastation that it is difficult to particularize any one kind of tree that suffered most. The gardens, after the gale had subsided, had the appearance of a wilderness, the ground being literally strewn with branches and twigs, many of the former of which were very large. In *Hampton Court Park* there was terrible havoc among the trees. Those fallen consist mainly of lime and elm, and there are sixty or more blown down five or six together; most of them are completely rooted up, including some splendid limes supposed to be 300 years old, and elms of perhaps the same age. We have not learnt of any tree of particular note being destroyed. In *Greenwich Park* the full extent of the havoc occasioned was not realized until the next morning, when it was found that no fewer than 23 large trees, principally elms, had been blown down, and about the same number of small trees, including several fine red thorns. From St. Mary's Gate to the Broad Walk no fewer than six large elms were down, and in the Broad Walk itself one large elm completely blocked the way. But it was in the Green Walk, a little to the east of the Royal Observatory, that the greatest damage was done; and within a space of 200 yards in circumference not a tree was left standing. There were lying about in a heap six elms and a large chestnut, the girth of whose trunk was not less than 20 ft. at the base.

Brentford.—The late storm has done considerable damage to the trees in this district. There are over thirty down in the pleasure-grounds and park, and

as many more are injured ; but fortunately they are nearly all common trees, such as elms, limes, beeches, and poplars. All our choice trees, such as deciduous cypresses, cedars, liquidambers, planeras, sophoras, gleditschias, tulip trees, and choice oaks, have escaped with the loss of a few branches. One large beech tree in falling lifted with its roots a mass of earth 20 ft. by 16 ft.—J. WOODBRIDGE, Syon House, Brentford, in *Gardener's Chronicle*.

Ealing.—The disastrous effect of the gale of wind on the night preceding and during the day of October 14th is seen in the overthrow of a magnificent elm tree in a field adjoining the garden of this house. The circumference of the roots and earth torn up is about 16 ft. ; while some idea of the dimensions of this fine tree will be gathered from the fact that it was 16 ft. in circumference at the base, and 14 ft. at a height of five feet from the ground. The height of the tree, as it now lies prostrate, was 60 ft., and the circumference of its foliage by calculation about 180 ft. The comparative ease with which this fine tree was overturned is evidently due to the shallowness of the soil through which the roots penetrated, as well as the incoherence of the gravel upon which its roots were lying, a foot or so below the soil. Large boughs have been broken off from another fine elm in the same field, as well as from a walnut tree near the house.—G. HENSLOW, Drayton House, Ealing, in *Gardener's Chronicle*.

Staines.—In this neighbourhood the effects of the great storm are very apparent. In Sir John Gibbons's Park, at Stanwell, over fifty trees have been laid prostrate, and one house was in great jeopardy by a tree falling across the roof. The oldest inhabitant cannot remember having seen the Thames so rough before.

NORFOLK—Wroxham Hall.—Hundreds of trees on this estate are blown down, and hundreds more are terribly mutilated. Huge elms are blown down, their roots lifting up great mounds of earth, as well as poplars, firs, willows, thorn, acacias, beeches, and ash trees, all of which are blown up at their roots. Oaks, whose trunks have withstood the blast best, are nevertheless severely damaged, huge branches being wrenched off them. Trees that have been ornaments of the park for a generation or more are completely spoilt. The roads and approaches to the mansion are blocked up, and the regular staff of woodmen have got their winter's work laid out for them in the clearing and tying up of the fallen mass of greenwood. It is lamentable to see the wreck that has been made. Great walnut trees that have stood many storms are rent in pieces. Such a gale has not been experienced here since the May gale of 1860.—*Gardener's Chronicle*.

NORTHUMBERLAND—Alnwick Castle.—The gale was very severe here for two hours at intervals. I believe there are over 4,000 trees down in the parks, and about 150 in the pleasure-grounds, principally beech, elm, and a few oaks. They are mostly all fine old trees, and all, or nearly all, quite uprooted.—ALEXANDER INGRAM.

Morpeth.—A terrific gale burst over this district, and raged with great violence for about two hours. Trees by the hundred have been uprooted or snapped in two. Many have fallen across the highways, so that the roads east, west, and north of the town are completely blocked. A boy at Mitford was caught by a falling tree, and severely injured.

NOTTINGHAMSHIRE—Thoresby Park, Cllerton, Newark.—The severe gale has caused a sad wreck on this estate—not so much the number of trees as the great quantity of branches. Some are of very large size. The mutilation of branches on the old oaks in Birkland and the park is very considerable, and this is no doubt owing much to the very heavy foliage that clung to the trees. The number of trees down is 195 and about 130 are birch. The others are scattered about in the park and woods, consisting chiefly of oak, ash, elm, and beech, with a few larch, Scotch fir, and spruce fir ; some of these are of considerable size, and range from eighty to three hundred years old. The young plantations have suffered but little, except in some places the Scots fir, *Pinus Austriaca*, *P. laricio*, &c., are blown on one side, and will require to be straightened and made fast.—D. JAMIESON.

Welbeck.—The following is a rough statement of what damage was done on this estate by the gale on the 14th October :—Oaks, 50 ; Spanish chestnut, 600 ; spruce, 15 ; beech, 10 ; birch, 60 ; poplar and black walnut, 70 ; larch, 82 ; ash, 12 ; various, 40 ; total, 939 ; the total value of which is about £600. It will be

seen that the Spanish chestnut has suffered most ; this, I consider, is caused by neglect of thinning in a great measure when young. The trees ranged chiefly from thirty to sixty years of age, have been sown in beds, and grown very thickly together ; the consequence is they have no roothold, and, having all their foliage on, caused the wind to play great havoc amongst them. The tree called the "Big Porter's Oak" had one of its large branches blown off, and part of the dead top also came down. Most of the trees have been torn up by the roots, but in some cases they have been broken off halfway. In the latter case they have chiefly been ash and beech. The poplars are on one of the out estates, and consequently, not having seen them, I can give no information, but I believe they are very large.—W. H. JAMIESON.

Worksop Manor Estates.—A gale began here on Thursday evening, October 13th, and continued with great violence till noon on Friday. We had no floods, though the rivers rose rapidly, and the trees were crashing down in all directions. In a space of about two acres on the Worksop Manor Hills there are sixty-five chestnut trees blown down, just in the manner that boys set up a row of bricks and start one, which knocks all the others down. On the Clumber and Worksop Manor Estates we have about 500 trees blown down.

						£	s.	d.
About 200	Spanish chestnut	25 to 45 years old,	value about	180	0	0		
" 100	Oak ...	25 " 60	" "	110	0	0		
" 100	Birch ...	20 " 30	" "	33	0	0		
" 50	Larch ...	20 " 40	" "	55	0	0		
" 20	Spruce ...	20 " 40	" "	13	0	0		
" 15	Beech ...	70 " 90	" "	50	0	0		
" 15	Elm ...	70 " 90	" "	50	0	0		
<hr/> 500						£491	0	0

We have a good many young pines, &c., of eight to fifteen years' growth, blown over in the young plantations, and damage done to the amount of £30.—W. TOMLINSON.

OXFORD.—The gale did much damage to the timber in the various College grounds. Four of the celebrated trees in the Broad Walk were destroyed, and twenty-four in the walks around Christ Church Meadow.

Swyncombe Estate, Henley-on-Thames.—The gale was very terrific here ; we are at high level, 726 ft. above the sea, and generally do not feel the wind as some of our neighbours at the foot of the hills, nor do we get so much damage to our timber as in the hollows. The timber on this estate had little damage done to it ; in the park three trees—two elms, with large heads and short butts, and a very high Lombardy poplar—were torn up from the roots ; these were in a line, and the current also rooted up a very large white thorn. In the middle of a beech wood of 300 acres there were eleven trees blown down where the timber had been felled last year, and in no other part of the wood were any rooted up. We should do well to mass trees at intervals in these gullies, particularly in the west, where we get all our heaviest gales from. At Watlington Park, close by, many trees suffered, but mostly aged ones. Our hedgerow timber did not suffer, being mostly ash and some very fine timber. Our fir plantations have escaped damage beyond a few broken tops of spruce and the Austrian pine ; the latter flourishes well on our chalk ; it is not a good timber fir, but very handsome.—GEORGE G. DIXON.

SHROPSHIRE—Weston Park, Shifnal.—A severe gale passed over this district, doing great damage to property, unroofing houses, blowing down chimneys, overturning grain stacks, uprooting and breaking the boughs off trees, causing great inconvenience to the traffic of the district, all the roads being blocked, and the telegraph wire broken. There are over 600 trees blown down on this estate, and nearly as many disfigured. Many of the fine old trees in the park and pleasure-grounds will never recover the damage done, and it will certainly hasten their decay. A fine old oriental plane tree on the lawn has about one-third of its massive top torn away. All kinds of trees have suffered, but these are mostly English elm (*Ulmus campestris*), especially in the fields and hedgerows, some of these contain from 100 to 200 cubic feet. One beech blown down in Tong Castle Wood has a large cylindrical trunk 24 ft. long by 11 ft. 6 in. in circumference,

containing with the limbs about 300 cubic feet of timber. I should think the value of timber blown down will not be far short of £1,000.—JAMES CRAIG.

Willey and Dothill, Bridgenorth.—The damage done to trees in this county by the gale is extraordinary; in noblemen's parks and in the lowlands and valleys the trees have suffered the most. Trees on the high ground have not been damaged to any extent. From my own observation and from what I have heard I should think 2,000 trees have been uprooted, approximate value, £3,000. Two-thirds are red elm, average age 150 years; next to the elm are oak, average age 100 years; black Italian poplars of all ages. I have not heard of any remarkable or historical trees being blown down. Plantations have not suffered much damage, neither have the pines. In Stanley Park, the property of Sir Henry Tyrwhit, Bart., near Bridgenorth, there are upwards of 100 trees blown down, most of them red elms, of large dimensions. There are thousands of trees which have suffered damage more or less by having their branches riven and torn off.—GEO. POWNER.

STAFFORDSHIRE—Blithfield.—The extraordinary gale which passed over here on 14th inst. was at its height at midday, and the destruction to timber, &c., was fearful, trees coming down with a crash in all directions, and large branches blown before the storm like pieces of tissue paper. It is supposed there are over 1,000 trees blown down on this estate. In one small plantation over 300 trees gave way before the gale, including oaks, larch, and spruce firs. The whole plantation is a complete wreck.—THOS. BANNERMAN.

Alton Towers Estate, Cheddle, Stoke-upon-Trent.—The gale on October 14th was of intense fury here. We have upwards of 300 trees swept down of all ages, and many which centuries have rooted in the soil. Scotch fir, spruce, and various pine trees suffered most, in many cases being split up in a most extraordinary way. Oak has also suffered much. Some Scotch fir plantations forty-five to fifty years old, growing on hard clay, and therefore not rooted deeply, and nearly 1,000 ft. above sea level, have suffered severely. Several very ornamental trees, such as fine old acacias, have succumbed to the storm. It is years since, if ever, we had such a storm here.—THOS. H. RABONE.

SUFFOLK—Sudbourne Hall Estate, Wickham Market.—A large quantity of fine healthy trees have come to the ground in the recent storm. The greatest loss on this estate is amongst the oaks. A large quantity of those down are fine young oaks from sixty to seventy years old. Spruce have suffered next to the oak, then beech; strange to say, very few ash have been uprooted, although many of them are broken; the slaughter amongst oaks may be accounted for by the weight of foliage which was much more dense than has been for years, and not having had any frost to bring down the leaves. I may mention that on the Campsey Ashe Estate, the property of J. G. Sheppard, Esq., the damage done is very considerable; several beautiful old limes have been uprooted and one of them quite twisted round, about 3 ft. from the base, leaving the stump in the ground. I should think one-third of the trees have either completely lost their tops or some of the arms hanging down. The fine old cedars have quite escaped, they are the cedars of Lebanon and the finest of the kind I ever saw. Again, I learn that the loss of timber on the estate of the Right Hon. Lord Rendlesham, M.P., Rendlesham Hall, near Woodbridge, is very considerable both in the Park and on the outer portions of the estate. On the estate of Captain Brook, of Ufford, near Woodbridge, a large number of very fine black Italian poplar have been brought down, about eighty in number. In looking over young covers of about six or eight years old, I find large quantities of the plants swayed to one side. The number of trees brought down by the late gale on the Sudbourne Hall Estate will be just under 100.—J. W.

SURREY—Chertsey has suffered from the recent storm. In Staines Lane, at a field in the occupation of Mr. W. Herring, the great force of the wind is shown by two large elms lying on the ground within forty yards of each other, and with the roots tons of earth were also taken, the quick-set hedge being raised up nine or ten feet high. Further down the lane two elms were thrown down on Mr. Bance's land, and Messrs. Ashby's telephone wire and posts were broken at several places. At Chertsey cricket field two elms were laid low, one of them taking part of a fence with its roots. At Captain Vardon's lodge gates a fine ornamental sycamore was destroyed, smashing the fence in its fall, and at Botley's

Park great damage was done. The Weybridge and Shepperton roads were rendered impassable for some time by the lumber across them, and we are informed that at Vanner's Farm, Byfleet, no less than twelve trees were blown down.

Cobham.—The gale was very strong here. Large trees were uprooted, a great number in Pains-Hill Park, belonging to Mr. C. J. Leaf; also at Cobham Park several fine trees were blown down. At Burwood, the Countess of Ellesmere's, two heifers were killed by a tree falling on them.

Croydon.—The gale caused a great amount of damage at Croydon. A large number of trees were torn up by the roots, knocking down fences, and stopping traffic in several parts of the town.

Dorking.—The gale was very destructive here. On the Reigate Road, near the entrance to Betchworth Park, a huge elm was thrown, and stopped the traffic for some hours. Two similar trees fell in Pixham Lane, and another over the Pippbrook stream, and the footway near Messrs. Boxall's brewery. At Denbies, Buryhill, and Wootton estates, as also at Sondes Place, a large number of trees were torn up by the roots. At Shere and Albury the trees suffered greatly.

Esher.—The wind committed sad havoc here, several splendid trees in Claremont Park being uprooted.

Walton.—In the grounds of Mrs. Sassoon's residence, Ashley Park, some forty fine trees were thrown, and on Mrs. Ingram's estate (Mount Felix) about twenty-six trees were either snapped asunder or ruthlessly torn up by the roots. At many other places here and at Hersham large trees were scattered in all directions. An accident occurred in Mrs. Ingram's grounds, a large elm tree falling across the road upon the head of a little boy who was instantly killed. Three other elms and a beech tree fell close by the spot where the accident occurred.

SUSSEX.—Oatlands, Uckfield.—The destruction of trees in this neighbourhood by the gale was inconsiderable; broken branches are plentiful enough everywhere, but fallen trees are few and far between. A couple of the tall elms in the avenue at Buxted Park are down, and a building was destroyed by a falling tree at Maresfield Park. Considering the extraordinary violence of the gale it is surprising how little harm has been done in the woods, but, sad to say, the finest trees upon the estate—two black poplars—are laid low. Both of them stood upon the eastern margin of a stream at the embouchure of a valley, up which the south-western gale swept with terrific force. A Scotch fir and a wych elm were also blown down, both on the margin of the stream, which was doubtless the cause of their downfall, there being none of the main roots on the windward side. The poplars were planted about eighty years ago. The largest measured 102 ft. from the base to its topmost branch; the bole up to the fork is 49 ft. long, has a mean quarter girth of 24 in., and contains 196 cubic feet of timber. It has three main branches, containing 30 ft. of measurable timber. The other tree was probably quite as high, but its head fell across a road, and was so much broken that a measurement could not be taken. The trunk up to the fork is 60 ft. long, and contains 157 cubic feet of timber, and the main branches probably would give 25 ft. more, but were broken by the crash past measurement.—EDWARD LUCKHURST.

WARWICKSHIRE.—Leamington.—The ornamental trees in Jephson's Gardens and the Holly Walk have suffered severely. Similar reports are received from all parts of Warwickshire.

YORKSHIRE.—Benningborough Hall.—The gale of wind and rain that raged over this part on the 14th October was very violent, blowing hard all the morning up to 3 p.m. from the south by west to north-west, at which point it gained its greatest pressure, and continued until 6 p.m., when it shifted to the north, and abated a little betwixt 3 p.m. and 6 p.m. Several large trees, elm, oak, poplar, and ash fell victims to its violence, their ages varying from one to two hundred years old. The oak has suffered the most, not having shed any of its foliage, and also having been infested these last two seasons with caterpillar. A few larch, from thirty to forty years old, have been uprooted; but our plantations being young and for the most part sheltered, have escaped any material damage. Fruit orchards have suffered the most about this neighbourhood, especially old favourite trees, many having been broken off close to the ground; more particularly plum and apple trees.—ALFRED FOSTER.

Birdsall.—Lord Middleton writes that three of the great limes in Birdsall Avenue—about which there was a correspondence in the *Journal of Forestry* very lately—fell in the great gale of October 14th. The gaps in the avenue are so unsightly that Lord Middleton is trying to put them up again. One has already been raised, denuded of its head, but still stands at a height of 80 ft.

Loftus Estate.—The wind was from the west, veering round to the north-west, and continued for about three hours. Several houses were unroofed, and chimney stacks knocked through the roofs, and scarcely a house has escaped damage, and whole stackyards have been blown down, causing serious loss to the owners. The plantations have suffered fearful damage. On Loftus estate 1,030 trees have been uprooted, of the value of £403, and the general damage to the trees still standing is nothing less. The branches of the hardwood are twisted and broken, and coniferæ have been loosened at the roots. Larches have suffered most on this estate, 770 being uprooted in one plantation; they are about 60 years old. On the Upleatham estate there are 1,390 uprooted; the oaks, larch, and Scotch pines gave way in greatest numbers. The trees there are older, and the soil is more suitable for growing heavy timber. Many trees have balls 4 ft. deep and boles 90 ft. of timber of first-rate quality, and clean grown; this is especially the case with the native Scotch fir, larch, and oak: they are about 100 years old, and were very healthy. All the neighbouring estates have suffered severely.—ANDREW SLATER.

Newton, Killington, York.—The damage to the trees here by the gale has been very great. Roughly reckoned there are about 600 trees down, of which about 100 are oaks from thirty to eighty years old, and the rest chiefly ash and elm, and a few beech, larch, and spruce. The most serious loss has been eighteen large English elms, githing from 9 to 15 ft. at five feet from the ground. Of these eleven stood round the church. Oddly enough the plantations have not suffered seriously; one plantation has one corner, consisting of six or eight large ash and beech, knocked down, while the rest of it has been hardly touched; another one, consisting of larch about twenty-five years old, has a lane made through it, about 20 yards wide and 100 long, in which nearly every tree is down. A great number of large thorn bushes, which must be quite 200 years old, are down. It is impossible to estimate the value of the blown timber; so much is down in the neighbourhood that it will be practically unsaleable.—A. J. CHOMLEY.

Owston Park, Doncaster.—The storm we were visited with was one of the severest we have known here for many years. I am unable to give you more than a general outline of its effects, but I may state that it seems to have struck with more severity on the eastern side of the country than on the western side. Passing across the country into Flintshire on the Monday following, it was only at rare intervals after leaving Yorkshire that I noticed any blown-down trees, and I found on arriving there that comparatively little injury had been done. The wind blew strong here during the whole day, and had been preceded by a heavy night's rain, amounting to three-quarters of an inch. Altogether we have something over a hundred trees blown down and broken over; of these over twenty are in the park and pleasure-grounds. The kind of tree which suffered most is the English elm, several fine old trees being broken over like matchwood, and others torn up by the roots, with large masses of soil attached. In the plantations the spruce suffered most. These being mostly situated on low ground, which had been soaked by the heavy rain, the wind had more effect on them than would otherwise have been the case. Besides the trees uprooted and broken over innumerable branches and strong limbs were broken off and strewed about in all directions. In this case the poplars suffered most, especially the abele and black Italian, some fine old trees being almost stripped bare.—DAVID TAIT.

Park Hill, Fylingdale, Whiby.—The severe gale which visited here on the 14th October was very terrific, and many of our farm buildings that were strongly secured were shattered, the roofs blown in, and the battlement and ridging carried away. The number of trees blown down is 495, estimate of market value £31 10s. The species of trees which suffered most are larch, chiefly growing on light soil, about thirty or thirty-five years' standing, and oaks about forty or forty-five years' standing, and growing on freestone soil. We have no

large trees down worth mentioning, nor damage to young plantations; the latter have stood well.—MATTHEW HODGSON.

Worley Hall, Sheffield, seat of the Earl of Wharnccliffe.—The gale did little damage here compared with what was done in the adjoining districts. In the most exposed situations the trees have lost a few branches, but nothing of importance has been blown down, with the exception of a few birch and mountain ash, which have succumbed in most of the woods and plantations, and which are of no great value. The young plantations planted within the last twenty years have suffered a little from the pines and firs having been lifted and thrown out of form; these will require straightening and fastening. One fine old oak, standing in a favourite wood in front of the mansion, which girths about 45 square inches, has lost another arm, 80 ft. long, which grew out about 24 ft. high from the ground. This is about the sixth limb which has been amputated. The greatest destruction to trees ever known in this country was last year, in the snow-storm which fell on the 27th October, which completely wrecked the woods on this estate.—GEORGE PARKIN.

SCOTLAND.

ABERDEENSHIRE—*Aboyne*.—We had no damage in this neighbourhood, nor any gale on the 14th October, at least to speak of. You will have some idea when I tell you that on 3,000 acres of plantations on this estate we have not over twenty trees blown down.—GEO. WYLLIE.

Keith Hall, Inverary.—The gale on October 14th in its effects in this district was mild in comparison with what is reported from other places. We have no wood blown down beyond a tree here and there, with the exception of one or two very old trees, the hearts of which were all decayed, and nothing but a shell on the outside left. Had the gale been as severe in this district as it is reported to have been elsewhere, we would have suffered severely, as the wood in general was full of leaf, and must have come down. The great damage here is to the standing corn, which is all but clean thrashed out, only it is fortunate there was little to cut.—JOHN CLARK.

BANFFSHIRE—*Cullen House, Banff*.—Gale, severe from the east, broke some limbs off ash and Spanish chestnuts, and blew down two beech trees of medium size. No pine or fir trees have suffered here, nor would the hardwoods have but for their leaves being still on.—C. Y. MICHIE.

BERWICKSHIRE—*Dunse*.—A terrific storm of wind and rain, blowing from the north-east, swept over this district, doing great damage to house property, trees, &c. In all directions overturned trees strew the public roads and fields, and so extensive and serious has the damage been that some of the principal turnpike roads which had been ornamented with groups of trees are completely blocked, and all traffic stopped. In a radius of three or four miles of Dunse thousands of trees are uprooted, and many of them smashed to pieces. Firmly-rooted, hardwood trees, of large dimensions, have been snapped through the trunk. On some parts of the roads as many as twenty large trees may be seen lying across the roads within a space of half a mile. Some of the mansion-house parks in the district have been greatly disfigured by the overturning or breaking through of trees of immense size that have stood the blasts of centuries. The storm came on with awful suddenness, and with a great rushing noise, and for a while seemed as if it would level every obstruction to the ground.—*Glasgow Herald*.

Langton Estate.—The severe gale which passed over this neighbourhood produced effects which are most appalling in their magnitude. A perfect hurricane of wind and rain was blowing from the N.E. The turnpike roads were completely blocked, in some places as many as thirty large trees lying across the road within 100 yards of each other. Once noble trees now present a most pitiable aspect, many of them having huge limbs wrenched off, while others, measuring in many instances 24 in. on the side, have been snapped through the trunk, leaving disfigured stumps as silent witnesses to the strength of the blast. On this estate the number of fallen trees cannot be computed at less than 5,000. Reports from surrounding estates seem to show that they have suffered even more severely, some of them having about one-third of their wood

prostrated. Larch appears to have suffered most. No doubt this can be accounted for from the fact that they overtop the surrounding firs, and thus present a more exposed surface to the wind. Many splendid specimens of the ash have also been levelled. A clump of about sixty magnificent beeches, which have weathered the storms of 200 years, have at last succumbed. As a general rule trees of over forty years of age have suffered most. In a few cases serious damage has also been done to young plantations, but not so much as might have been expected. Old residents on this estate pronounce the storm to have been the severest felt within their memory, and many years must elapse before the damage done to the plantations and policy woods can be repaired.—PETER GOW.

BUTESHIRE—Bute Estate, Rothesay.—On examining the barometer on the morning of the 14th October I found that a great vacuity had taken place from the previous evening, and, though comparatively calm at the time, I remarked that there must be a "pitch in" somewhere not far off, as the glass had gone down by the run. Shortly after seven o'clock the glass began to rise and the wind to increase till about midday, having veered round from N. to N.W. We have no wind-gauge here, but taking the usual scale (0—6) as a guide, I reckon that during the greatest gusts the average force would be from 3 to 4, or 2 degrees below that of the Tay Bridge gale. Comparatively little damage has been done in Bute. An ash tree, 166 years old, much decayed at its base, has been broken off about six feet from the ground, a beech tree or two growing in swampy ground have been blown over, and a few limbs of beech and horse chestnut have been wrenched off. No damage has been done to pinewood, and the damage to stacks and house property must be comparatively trifling.—JAMES KAY.

DUMBARTONSHIRE—Alexandria.—Regarding the gale of the 14th October, I may state that we are pretty much sheltered from storms, lying inland, and with the exception of a few broken branches and one old thorn, we have nothing of consequence to report. From the Clyde I learn that the gale was severe. At Roseneath Castle some valuable trees succumbed to the gale. The storm was at its height about 2 p.m. here. I walked along the edge of Loch Lomond about that time, and observed some fine oaks stripped of their branches. One walnut tree, clad with fruit, was left almost bare of leaves and nuts, some of which I gathered. The old thorn, which stood the memorable Tay Bridge gale, went over. The wind pressure was very high at the time; had it continued, we would have lost some fine oaks, which are rare specimens.—F. WALTERS.

DUMFRIESHIRE—Jardine Hall, Lockerbie.—The gale passed over here with great force, in gusts, but, with the exception of one or two trees, I am glad to say the plantations here have escaped in a marvellous way. Previous storms have generally twisted off or broken a great many branches from large trees, but in this gale there are no branches broken.—ALEX. JARDINE.

Drumlaurig.—Concerning the gale we have been highly favoured in the Vale of Nith. The storm was not so severe as in many places; therefore little damage has been done on the Queensberry Estates. A few young trees of small value on exposed situations have been blown down, the soil being loose and wet after the late rains. No remarkable or historical trees on this estate or policy have been blown down or damaged.—JOHN FINGLAND.

EDINBURGHSHIRE—Dalkeith Park.—The storm has done great damage here; I do not know how many trees are down, but there are at least 150. One peculiarity of the gale may be mentioned; it seems to have struck this place in violent gusts: in a sheltered glen there are six large trees all lying close to each other. At another place, about half a mile off, there are a dozen Spanish chestnuts piled in a heap. In an old beech plantation, also sheltered, there are three trees with their tops twisted off and one blown over. The old oak forest, on the contrary, has escaped with trifling damage, only three trees being down and several branches broken off. The damage has not been confined to trees of any particular age or class, but is general. In a mixed plantation of oak and Spanish chestnut, the former as a rule have withstood the blast, while the latter have gone down before it; on other parts of the estate, however, the oaks have suffered terribly. It will take three months' continuous work to dissect the trees, blast or bury the roots, and repair broken fences. I have no recollection of such a violent storm.—ROBERT BAXTER.

ELGINSHIRE—*Darnaway Castle, Forres*.—The heavy gale did little damage here; a good number of branches have been twisted and broken, but not more than a dozen trees have been uprooted, and these of small dimensions. Apart from the damage to uncut crops and those yet in "stook" in the highlands, the northern counties have suffered nothing when compared with the fearful destruction to trees of all kinds farther south.—D. SCOTT.

Strathspey.—The gale was spent before reaching this district. We experienced little or no damage, only a very few trees having been uprooted. One ash, a very old one, about 2 ft. in diameter, was broken, and a small gean blown down in the vicinity of Castle Grant. There are not more than fifty trees of all sizes uprooted, but in some of the younger woods, where squirrels have injured the bark, a considerable number of tops have been broken off.—J. G.

FIFESHIRE—*Donibristle, Aberdour*.—The gale commenced about 10.30 a.m. from the east, accompanied with heavy rain, making it dangerous to move about, our carriage-drives being literally covered with branches of different sizes, and large limbs falling from the trees in every direction. I never saw such havoc made in so short a time. However, we have not suffered so much as some others appear to have done. We have in all about forty hardwood trees uprooted, varying in size from 3 ft. to 10 ft. 6 in. in circumference. Beech has suffered most, although two of the largest are elms, one of them being 10 ft. 6 in., the other 9 ft. at five feet from the surface; a fine old beech in the avenue 9 ft. round at five feet was broken clean over about fourteen feet from the ground; two old ashes fully as large shared the same fate. There are six of these forty trees at least 180 years of age—80 years about the average of the rest. A very fine *A. pinsapo* has been destroyed, one-half of it being torn away; outside the policy grounds about 200 trees, principally firs, spruce, Scots fir, and larch, varying in size from 2 ft. to 6 ft. five feet from surface, are down. Of course there are a good many trees damaged by those that were blown over, but after being dressed up, it will not disfigure them very much.—JAMES MITCHELL.

FORFARSHIRE—*Strathisla*.—The extraordinary gale of October 14th was something tremendous here, but we have not suffered so much this time as when the Tay Bridge came down. There are a few noble trees down in the deer park at the castle, and many others with their limbs wrenched off and twisted and broken. There are some oaks blown down, 150 years old and upwards. It is the hardwood that has suffered most. We have a few hundred firs down, but nothing to speak of; the common oak, ash, Scotch elm, and horse chestnut have suffered most in the park.—JOHN DAWSON.

Glamis.—The effects of the storm here will long be remembered by the destruction done to plantations and other property—blowing down trees, breaking limbs, and leaving many fine ones standing only bare poles. The plantations that have suffered most are those with a north-east exposure. On this estate many fine trees were blown down and broken, but do not exceed one-sixth part of the number levelled to the ground by the disastrous gale on the 28th December, 1879, although on some neighbouring estates the number of trees down far exceeds that of two years ago. Trees blown down on the 14th inst. on the Strathmore estates number 1,500, and in total value about £400, and average in age from 35 to 120 years. The species of trees that have suffered most are spruce, from thirty-five to fifty years' growth. In many cases the full amount of damage done cannot as yet be estimated, for in many vigorous, well-grown plantations large openings are made, with only a solitary tree or two left standing.—JAMES CRABBE.

Pannure, Carnoustie.—This district was visited by a very severe storm of wind from the north, with heavy rain and sleet, flooding all the burns, making them to overflow their banks to an extraordinary degree, and uprooting a great many trees (the Tay Bridge gale uprooted only some 150)—upwards of 900, besides tops wrenched off, heavy limbs broken, and branches twisted in all directions. The species of trees that have suffered most are birch and oak, about eighty years of age, and Scotch fir and spruce, about twenty-five years. One fine plane tree, about 110 years, a beautiful park tree, at 3 ft. from the ground measures 12 ft. 6 in. in circumference, length of bole 5 ft., then breaks off into three large limbs, which formed a beautiful top; height of tree about 60 ft. laid flat. The thickest parts of the woods seem to have suffered most. The

foliage being on the trees acted as a sail to catch the wind, and with the heavy rainfall the trees could not resist the blast. A good many of the beeches are in the policy woods.—J. ROBERTSON.

HADDINGTONSHIRE—Broxmouth Estate.—The storm has done indescribable damage to the woods and young plantations on this estate. Whole acres of oaks, beeches, and elms have been blown down in the Wilderness and Ward Wood, and all over the place trees are uprooted and snapped over at the ground and at various heights. Oaks where exposed to the fury of the gale are very much dismantled.—WILLIAM MCKELVIE.

Tynninghame Estate.—The gale came on like a thunderbolt, and lasted for about two hours; the atmosphere was literally filled with leaves, twigs, and branches, flying in all directions. The number of trees blown down on the Tynninghame estate alone cannot be less than between 30,000 and 40,000, at an approximate value of nearly £15,000. Beech and Scotch fir have suffered most, and the brave old oak has in many cases shared the same fate. The average age of beech blown down is about 150 years; Scotch fir about eighty years old. One remarkable old beech tree has succumbed, named the Trysting Tree, about 300 years old. I measured some fine beech and oak to-day of from 100 to 170 square feet of wood in the trunk. The damage done to Tynninghame policies and otherwise cannot be less than £50,000.—WALTER GRIEVE.

Whittinghame Estate.—The sudden and extraordinary gale left sufficient evidence in this district of the widespread devastation it committed. Though, compared with neighbouring estates, the damage done may be described as trifling, it is still so extensive as to be unsurpassed by any single gale in the memory of the present generation. In the plantations about 500 trees have been uprooted, or so shattered and broken as to necessitate their removal. The fir plantations in the higher elevations have suffered most, but the pecuniary loss may be estimated at very little, as they are timber size and few of them shattered. Where no estimate can be accurately made the destruction is greatest, viz., in the much-prized oaks and beeches that line the avenues, and in some of the finest and oldest larches, ashes, and oaks. Two cases may be mentioned of oaks that have stood the storms of at least two centuries. The one in the valley just below the Manor House has been left with nothing but the bare trunk, and the other, about 200 yards farther down the valley and not far from the bank of the river, has been fairly prostrated, uplifting several tons of soil with its roots.—ROBERT MCCUTCHEON.

INVERNESS-SHIRE.—Corrimony, Glen Urquhart.—The extraordinary gale passed over here with but very little damage on this estate or others in the neighbourhood; though there have been a good many trees blown down, still nothing worthy of taking any particular notice of. We thought it a very severe gale, with snow and rain intermixed, blowing very hard from the north-east, but it seems to have been more seriously felt in the south; we have not over two-score of trees blown down altogether over an area of about five or six hundred acres of natural birch and fir plantations, &c.—JAS. McCULLOCH.

LINLITHGOWSHIRE—Hopetoun.—There was but little damage done to trees here only about thirty in all being blown over, and none of them worth much; the whole would not exceed £40 in value. They consist chiefly of elm, ash, beech, lime, larch, and poplar, and most of them were growing along the shore of the Frith of Forth. Had woodlands been well drained, and the tops of trees well balanced by timely pruning, there would have been fewer trees blown over, and fewer broken branches.—J. McLAREN.

MORAYSHIRE—Alyre.—The gale, accompanied by torrents of rain, passed over here with comparatively little damage, except a few oak limbs which were torn from the trees. During the height of the gale I visited the patriarch hooped-up walnut at Alyre House that Mr. Grigor refers to in his book on arboriculture, and I am proud to say that it has withstood the effects of another severe gale. On the three Alyre estates there are not over three dozen trees blown down.—P. McLAREN.

NAIRNSHIRE—Nairn.—The gale was felt at Nairn with very great severity, but no serious damage was done. One of the old historical trees of the Countess's has been blown down. The river is much swollen, and has brought down a number of uprooted trees.—Scoteman.

PEEBLESSHIRE—*Portmore, Eddleston*.—The storm passed over this district very mildly indeed ; out of 1,000 acres of plantation we have only about fifty trees blown down, and none of them of any importance, so that the damage done is so very trifling that I dare say it is hardly worth recording.—**JOHN C. SMITH.**

PERTSHIRE.—*Alyth*.—In the woods the destruction was really serious. In the wood of Loyal trees are down in clumps. In the woods of Bamff great lanes are opened through the thickets. At Balloch, Buchal, Balhary, and Johnshill districts trees of great age and of all kinds are prostrate.—*Scotsman*.

Murtly Castle.—The great wind storm of Friday, the 14th October, reached its maximum here about 9.50 a.m. About 7 a.m. the barometer stood at 28.70, and retained that position for about an hour. From that point it descended rapidly to the very low reading of 28.18 at 9.15, and remained there till 9.45, when it began to rise rapidly, till at 2.45 p.m. it stood at 28.83. At 9.15 the force of the gale was very great, but five minutes later brought the great wave that caused all the damage here—it did not last over a minute and a half. The noise in the air was indescribable, but closely resembled very distant thunder ; and one was led to think he could feel the vibration before the blow reached and after it passed away. The breadth of the wave did not exceed one and three quarter miles, and passed from north-east to south-west, though sometimes altered by the formation of the ground over which it passed. In the Murtly grounds and woods the hardwoods have suffered most, not by any great number being blown down, but sheer mutilation of limbs and minor branches, disfiguring the trees very much ; oak, ash, elm, and beech have suffered alike. This may be accounted for by the trees being still in full leaf, thereby offering greater resistance than had the leaf been shed. In the grounds, *Abies Douglasii* suffered more than all the other pines put together ; a good many are blown down of the younger class, about 30 ft. in height and under. This is undoubtedly brought about by a too elaborate nursery treatment. All the larger and older trees of this tribe have escaped with a few tops and branches broken, even though they are in a much more exposed situation. The number of trees blown here has not yet been ascertained, but they amount to several hundreds.—**D. F. MACKENZIE.**

Scone, &c.—Upon Lord Mansfield's estates of Scone, Lynedoch, Logiealmond, Innernytie, and I'ymount, in Perthshire, and Balvaird, in Fifeshire, there were upwards of 2,500 trees blown down on the 14th inst. The great majority of these are plantation trees upwards of fifty years of age ; they consist chiefly of spruce and larch.—**WM. MCCORQUODALE.**

ROXBURGHSHIRE.—*Floors Castle*.—The district round Kelso has suffered severely. More damage has often been sustained by buildings by gales, but there is certainly no record of any such widespread destruction among trees as is now to be seen around this district. The trees still retained their foliage, the ground was very wet, and the gale came from a quarter (N.N.E.) from which that district seldom experiences severity. These conditions combined to make the storm a very memorable one. Had it occurred a month later, when the trees would be stripped of their leaves, it would possibly have passed with ordinary effects. Communication was greatly interrupted by the fallen trees, and not a few narrow escapes were made from the falling timber and the terror of horses. In one case a gardener was so intent watching a tree which threatened to fall that he had not time to escape the sweep of the smaller branches, which brushed him rather sharply, while the tree fell athwart the vinery, cutting it into two. The grand old plantations within the Duke of Roxburghe's domain at Floors Castle have suffered fearfully ; not fewer than 800 of the finest trees are uprooted, and 200 more are so damaged that they will have to be cut down. Of these latter some trunks stand 40 ft. high, stripped as bare as a walking-stick. Trees are down everywhere, but there are "warm corners," and at distances of 100 to 150 yards there occur more sweeping breaches or gaps, penetrating from the north, say 150 yards into the plantation. These plantations are mostly oak, beech, and elm, but the fallen represent every variety of forest tree, and it is quite impossible to say which species has best withstood the tempest. It is difficult to approximate the value, but when it is stated that the trees are from 120 to 200 years old, and girth from 6 to 9 and up to 11 ft., and contain from 100 to

160 cubic feet of square timber, the money value will be seen to be very great. It has, indeed, stripped Floors Castle Policy of some of its former grandeur. The loss is felt to be a public loss, for, while the Duke justly prides himself on his grand beeches and oaks, the liberality which opens the gates once a week to thousands, calls forth expressions on all sides for the irreparable loss suffered by the owner. At Bowmont Forest—an extensive plantation belonging to the Duke of Roxburghe, and about six miles from Floors Castle—a track of four to five acres is swept clear of Scotch firs, about 80 years old. Heavy damage has been done to the woods at Stitchill House, Newtondon, Broomlands, Hendersyde Park, Springwood Park, and Sunlaws. Very great havoc has been wrought among the fine trees round Mellerstean House, the property of the Earl of Haddington. It is not a wide estimate to say that within a radius of four miles round Kelso 3,000 large trees, mostly hardwood varieties, have been uprooted, and that their value cannot be much under £6,000.

STIRLINGSHIRE—Rednock Estate.—I am glad to inform you that Thursday night was wet, with high winds, also Friday forenoon, when the rain cleared off, leaving a high wind, which did much good in this district in the drying of the outstanding crops. I do not think we have a dozen trees uprooted on the property, and, on the whole, I am of opinion the winds did more good by far in this district than harm, stacks not even suffering injury.—A. STEWART.

IRELAND.

ANTRIM.—A terrible storm of wind passed over this district on Friday, the 14th inst. I am informed by people living in this locality that they have not witnessed anything like it for many years. It far surpassed the memorable Tay Bridge gale, nearly two years ago. The gale, blowing from a north-westerly direction, reached its height here from 11 to 12 a.m. I passed through a plantation on Greenmount Estate a few minutes past eleven; not a tree was moved at that time. I came over the same ground in less than an hour, and was surprised to find a dozen large trees all down, some of them several tons weight. All over the district I observe large ashes and elms broken and twisted in all directions. Some fine old ashes and elms also fell in the grounds of Antrim Castle. Perhaps we felt the fury of the storm here with more force, being fully exposed towards the shores of Lough Neagh.—GEORGE DODDS.

ARMAGH—Loughgall.—On the 14th October we experienced a very severe storm from north-west; the fury of the gale was at its height at 9.30 a.m., which blew down a great number of trees on the home farm, the property of Francis Robert Cope, Esq., J.P., D.L. We had a grand elm, about 125 years old, blown down, its height being about 75 ft.; the circumference two feet from the ground was 9 ft. 4 in., and 30 ft. of the trunk weighed over five tons: in falling it caught a beautiful chestnut, age about 100 years, which was crushed under the weight, and the remainder had to be cut down. Between the Manor House and the kennels a good specimen of an elm tree was broken about 40 ft. from the ground, being about 70 ft. high. Further on an ash tree, about 60 ft. high, was broken about 25 ft. from the ground. In this part the beautiful avenue of limes escaped, all of which are for a quarter of a mile about 80 ft. high; fortunately for them we had a few frosty nights, which partially stripped them of their foliage. In the backwoods two very large poplars were taken down; I should think they are over 100 ft. high, and are about 200 years old. In another part of the same wood a large oak was taken up by the root, also a large birch, about 35 ft. high, two oak trees, and a fine spruce about 40 ft. high were taken from the root. A number of branches have been torn off large trees. I was unable to go through all the woods, and cannot therefore correctly estimate the loss sustained. Last year we planted 39,500 trees, mixed plantation, and this year we intend planting about 30,000. I find immense damage done to large plantations in this neighbourhood.—NEIL McNEIL.

CAVAN—Farnham.—Regarding effects of storm, there was very little damage in this locality, most of the injury being a few branches broken off, in all about eight or ten cartloads, value of about 15s. There were seven trees blown down, two beech, value of about £1 10s., two ash, value of about £1, one oak, value of about £1 5s., one sycamore, value about 7s. 6d., one elm, worth about £1. Elm,

ash, and one beech rotten. The gale blew from the wrong direction to do us much harm.—ALEX. BLACK.

WATERFORD.—*Curraghmore, Portlaw*.—The gale which we had here played with terrible effect upon some of our high-lying mixed fir plantations, two of which on the morning subsequent to the gale presented a very wrecked appearance. It also destroyed a large number of fine hardwood trees in the demesne, principally oak, ash, elm, &c.; two of the latter had attained to magnificent proportions, and were truly splendid specimens of their kind—English elm. The two contained about 450 cubic feet of timber, and had boles of remarkable length. One of them measured nearly 100 ft. The most of our hardwood plantations are well sheltered from the west and south-west winds, consequently the late gale had little effect upon them. A few of them are much exposed, but nothing happened to any of them worth mentioning. The total number of trees blown down on this estate is 1,300, three-fourths of which are Scotch and spruce fir, and are worth, I should say, about £300. The Scotch and spruce were planted sixty years ago, the hardwoods average from 100 to 150 years.—DAVID ROBERTSON.

WALES.

CARMARTHENSHIRE.—*Ha'odunos*.—The storm was felt severely here, and the loss has been greater than at any time for forty years. Large trees were thrown ruthlessly down, whilst others, with stronger root-hold, were snapped off from four to twenty feet from the ground, leaving nothing but the bare poles or the broken branches hanging. In walking through the pleasure-ground here about 7 a.m. not a tree was down, and but few branches, but soon after that a fine oak was blown down, others falling in quick succession, amongst them being two very fine Spanish chestnuts, also a very fine horse chestnut much injured by losing a large limb. Our *Abies Albertiana*, which is now upwards of 65 ft. in height, escaped with a few branches broken, though fully exposed to the gale, and bending sometimes apparently half-double. Conifers suffered but little, only one being blown down, viz., *Chamaecyparis sphaeroides*, 25 ft. high, and girthing at the base 28 in. The reason of the oaks and other deciduous trees suffering so severely is, no doubt, owing to their being at the time full of foliage, and the soil in most places being shallow, no tap roots are formed, most of them running near the surface, subsoil being cold blue clay or whinstone rock. In the plantations we have suffered most severely, some of them having great gaps of 20 ft. or 30 ft. blown down from one side to the other. After the first line or two gave way those which had always been sheltered by them could not resist the terrible strain, and fell pell-mell in quick succession. In the course of a few hours as many as 1,500 fell, larch suffering most severely, as the plantations are principally composed of them. Where spruce and larch are growing, spruce suffered most; Scotch have suffered least. In some plantations, exposed to the full force of the gale, scarcely a tree fell, although the soil was also thin. The average age of plantations which have suffered most is from thirty to forty years. I value the windfalls approximately at £250.—JAMES MCNAIR.

Kimmel Park, Abergale.—We have suffered severely from the storm. Although plantations have escaped moderately well, park and hedgerow trees have been much damaged. The total number of trees blown down in plantations on this estate will not much exceed 200. Many large plantations have received little or no damage, while others considerable. In one plantation of about twenty-six years planted, the trees being about 35 ft. high, I found about seventy larch trees blown down within an area of ten acres, while in another mixed plantation of 100 acres there are not more than half a dozen down. In the park here we have lost many fine old and valuable trees, which, although many of them were past maturity, were grand ornamental park trees; in fact, nearly every other tree in the park has been more or less damaged. Several fine old trees have been broken over just above the ground, and others snapped asunder about middle height. One fine beech was broken over above the ground, and in falling broke an oak and an elm clean through about 9 ft. up, girthing respectively 6½ and 7½ ft. These trees stood in front of the mansion house, and within 100 yards of the terrace wall; another fine oak, about 200 yards distant, was blown down; several large elms are also down in the park. A large elm was blown down at Wigfair, between St. Asaph and Denbigh; several large

elms and a few ash, beech, and chestnut, on the Lleweny estate, and others much damaged. Glanywern Park suffered by the loss of an elm, and several oak, ash, beech, and chestnut were very much damaged. Although many are of little market value, we much regret their loss, as many noble and picturesque trees have been destroyed, which were highly valued by their owner. At Cotton Hall, near Denbigh, Lleweny estate, an elm tree broke over above the ground, circumference at five feet up, 20 ft., twenty-three feet up, 13 ft., forty feet up, 11 ft., height 98 ft., unsound; beech tree at Cotton Hall, uprooted, circumference at five feet up, 11 ft.; beech tree in Kinnel Park, broke over above ground, circumference at five feet up 16 ft., unsound; oak tree in Kinnel Park, blown over, circumference at five feet up, 13 ft.; all these are on the estates of Hugh R. Hughes, Esq., of Kinnel. The principal trees down in plantations are larch and a few spruce, while the hardwoods are principally elm, with ash, beech, and oak mostly broken and damaged.—LEWIS BAYNE.

Llanerch, Llanelly.—In this neighbourhood, although there has been nothing to equal it for many years past, yet on the whole the destruction wrought by the recent gale is not so serious as we supposed it would have been when the storm was at its height. Then, in exposed places, the trees, their massive limbs, and even trunks, were snapping with a sharp report, their smaller branches were flying away like storm birds, while now and again one fell over in a mass of shrivelled foliage, broken branches, riven trunks, raised soil and roots. The woods and plantations here are chiefly situated in the sheltered glens and ravines that intersect the country in every direction, consequently the damage done must be small compared with that of more exposed districts. The species that have suffered most are larches from 30 to 40 years of age, in the plantations, and English elm in the hedgerows, or on the more open and exposed grounds. The damage done on this and neighbouring estates will, I think, be approximately represented in one tree blown down to every two acres of woodland. So far as I can learn, no remarkable or historical trees has suffered.—ANGUS MACINTOSH.

CARNARVONSHIRE—*Penrhyn Castle, Bangor.*—Considerable damage has been caused to trees and shrubs by the severe storm here. A great number of trees, both large and small, were uprooted, branches twisted and broken, and scattered in all directions. Several of the fine Cornish elms in the park, as well as oak (principally Turkish), ash, sycamore, beech, and pine trees, have been blown down. Many of the outlying plantations are known to have suffered severely; the exact damage has, however, not yet been fully ascertained, all available hands having been engaged up to the present time in clearing the park drives and roads of fallen timber.—ANGUS D. WEBSTER.

DENBIGHSHIRE.—*Bodnant Estate.*—The gale commenced here on the evening of 13th October about nine o'clock, accompanied by heavy rain, as much as 1·52 inch having fallen during the twelve hours preceding 9 a.m. on the morning of 14th October. The inhabitants declare they have not witnessed anything like it since the gale in which the *Royal Charter* was wrecked, some twenty-five years ago. The mansion here stands at an altitude of about 300 ft. above the level of the Conway, and has suffered considerable damage. Timber damage consists of about 67 trees uprooted, consisting of oak, ash, elm, about eighty to eighty-five years' standing. One huge Lombardy poplar broke off about eight feet from the ground; had it been sound it would have measured some 200 ft.: it was decayed to within three inches all round the stem, and when felled the trunk had the appearance of a large wine bin. A thriving oak plantation, about 45 acres in extent, of forty years' standing, suffered heavy damage by being broken and limbed; in this case very few trees were uprooted, but I estimate the loss sustained equal to £4 per acre. Many specimen trees in parks and pleasure-grounds throughout the Vale of Conway have been sadly broken and dismantled; in such cases it is difficult to estimate the loss. One incident worth recording was the uprooting of an ash and birch, which grew together in a hedgerow, forming one head and quite a feature in the landscape, having stood at an altitude of some 550 ft. above the level of the Conway. The two, containing considerably over two tons of timber, fell through the roof of an adjoining cart shed, smashing the building and a cart to atoms: a quantity of poultry had taken shelter in the said shed, and some twenty of them were killed.—ALEXANDER STEWART.



The terrible gale which swept the British Isles on the 14th of October, with such sadly fatal results to the seafaring population on our coasts, was unusually disastrous to forests and woodlands, and many a noble tree has met its doom from the fury of the wind, after rearing its sturdy head for centuries against the force of the most destructive storms. Such general and widespread destruction to trees and plantations in this country is not on record; at least, we have failed to find any account of a former storm so terribly disastrous to trees in every part of the country. It is difficult to point to any district where the trees have not suffered severely from the gale; but its greatest strength appears to have been felt along the eastern coasts, and inland to the backbone of the country. In all districts with an eastern exposure the work of destruction is indeed lamentable. Hundreds or thousands of splendid trees, some historical, many ancestral, and all worthy of passing remark, have been overwhelmed in the general ruin, and centuries must elapse before the spots on which they stood can again be clothed and adorned with such grand monarchs of the forest. Every arborist must read with a feeling of deep regret the heavy record of casualties to woods and trees which is presented to them this month, and to which we refer them for details of the terrible effects of the storm.

* *

The Twenty-Eighth Annual General Meeting of the SCOTTISH ARBORICUL-

TURAL SOCIETY must be recorded as the most important which has yet been held under the auspices of the Society, and also as one of the most successful. The admirable opening address of the noble President, the Marquis of Lothian, touched in the most appropriate manner on various topics of the greatest importance to forestry and foresters, and pointed out with clearness and precision what are the aims and objects of British forestry in the empire at large, and the pressing necessity which exists for a British School of Forestry. We trust that the wise remarks made on this important subject by the noble President will in due time bear good fruit, and that we shall soon see the stigma wiped out of this being the only country in Europe in which there is no institution for the education and training of foresters. There are no difficulties in the way but what can be easily overcome by those who have the knowledge and are determined to succeed; and any extent of land can be as easily acquired for this as for any other public purpose of national importance, when the Government can be persuaded to take up the subject in earnest to accomplish it.

* *

To effect this object the Scottish Arboricultural Society has immense influence, and it ought to employ every means in its power to have the matter laid fully and clearly before the public, so that popular opinion may be brought to bear with such irresistible force on the Government that it may at once

undertake an important national duty, which has already been too long neglected. For home wants alone a Forest School is urgently required; but when we look abroad to India and the Colonies, with their vast natural forests rapidly disappearing, and threatening dire calamities to these productive sources of national wealth, it is really appalling to think of the imminent risk we run through lack of properly trained foresters, thoroughly qualified in science and practice to go forth to any part of the world, to undertake the proper management of any forests, however extensive, and which are peculiar and necessary to the welfare of the country in which they grow.

* *

The acquisition of a Royal Charter by the Society would be a step in the right direction; and the influential committee to which the matter has now been entrusted is a guarantee that the interests and importance of the Society will receive due recognition from the authorities. We may therefore expect to see the Society in possession of this desirable document at an early period; and under its ægis it will be able to accomplish much that is now beyond its reach, beneficial alike to the Society and to forestry in general. In the matter of education this will be specially felt. With the aid of the authority conferred by the Charter, the Society will be able to act with effect in prescribing a standard of education for foresters; and its diploma for efficiency will carry undeniable weight in favour of successful students of forestry. The report of the Education Committee, although meagre and indefinite, clearly shows the strong and anxious feeling which prevails among practical men for the establishment of an educational institution, where foresters may thoroughly qualify themselves for the proper fulfilment of the duties which they may be called upon to perform in the execution of their office. The Society must strain every nerve to obtain an early and successful solution of the question of the best

system of education for foresters in this country.

* *

Turning to the finances of the Society, it is gratifying to note that they are in a flourishing condition, and that the increase of new members goes on with unabated vigour. With a roll of members approaching 800, the Society should have ample means for replenishing its exchequer; still it requires business tact and abundant energy and good management to collect the funds from such a large constituency, and to show an improving balance from year to year. The Society is happy in possessing such an efficient Secretary and Treasurer as Mr. McLaren, whose industry and skill in the management of the affairs of the Society are worthy of all praise.

* *

The list of prize essays announced at the meeting showed a marked improvement in that department. Not only are the essays more numerous than on any former occasion, but the number of writers is nearly doubled this year compared with last, and the matter of the essays, in the opinion of the judges, showed an equally decided improvement. This is as it ought to be, and we trust to see a keen competition in future, by an increasing number of essayists, for the valuable prizes offered by the Society on almost every topic of interest to the forester.

* *

The subjects were not so thoroughly thrashed out as could be desired in the discussions with which the meeting terminated. The length of the proceedings, without any interval, to a certain extent accounted for this, but none the less the Society, or its Council, should take note of this, and either make provision for a full and thorough discussion of every subject on the programme or delete these discussions altogether. The subjects set down for discussion were of much importance, and the excellent illustration given by Mr. Barry of an easy and more exact method than that usually adopted for

the measurement of trees was well deserving of the attention of a "fuller house" than the thin sprinkling of earnest members, who waited and listened attentively to it. The discussion on "The Deterioration of Spruce in this Country" nearly escaped a total collapse for want of a leader, till Mr. France promptly volunteered to lead off, and in an able and well-reasoned speech set a discussion going, in which the subject was ably treated, from their various points of view, by a fair proportion of the members who still remained in the hall

* *

A new departure was made by the Society, by the inauguration of evening lectures, in connection with the annual meeting, on some topic relating to forestry of general interest. Members and the public generally are certain to derive much benefit from these lectures, if they are only carried on in the admirable way in which they have been begun. A happier hit could not have been made than in securing the services of Sir Richard Temple, Bart., K.C.S.I., to honour the Society by delivering the opening lecture. Upon such a theme as the "Forests of India" few can speak with the same experience, and none with the ability of Sir Richard Temple. For nearly two hours he riveted the attention of a large and appreciative audience by the delivery of a most eloquent and instructive lecture, in which he ably reviewed the past and present of Indian forests and forest conservancy, and gave valuable suggestions as to the great need of a British School of Forestry, to enable us to send out trained and skilled foresters for the improvement and management of the forests of India. In another part of this number we give a *resumé* of Sir Richard's lecture, and we believe our readers will appreciate the reading of it.

* *

As an interesting feature in connection with the above lecture, it

should be noted that the Arboricultural Society, learning that the Scottish Horticultural Association held its usual monthly meeting earlier in the same evening, courteously sent an invitation to hear Sir Richard Temple's lecture to the President, Mr. John Downie, and all the members of the Association. Immediately on the conclusion of the business the Horticultural Association proceeded in a body, about sixty strong, to hear the lecture, and added considerably to the deeply attentive audience.

* *

The Excursion of the Society to the famous woods of Haddingtonshire (the full report of which is unavoidably crowded out this month) was, as it deserved to be, a thorough success. Both transport and commissariat were faultless, and the route so well arranged that every point was reached at the appointed hour, and fair time allowed to do justice to the various objects of interest met with in the course of the day. For this efficiency the excursionists were indebted to Robert Hutchison, Esq., of Carlowrie, who, with the able assistance of the Secretary, carried out all the arrangements. Arborists are deeply indebted to the liberal-minded owners of such grand trees and beautiful woods for so freely throwing them open to the inspection of the Society; and the kind interest and generous hospitality displayed towards the members by the Earl of Haddington were in every way worthy of the noble owner of the magnificent Binning Woods.

* *

Taking advantage of the annual meeting being held in the adjoining Royal Botanic Gardens, some of the members of the Scottish Arboricultural Society paid a visit to the new Arboretum at Edinburgh. After picking their way over rough walks and

through long, coarse, dank weeds and grass, the visitors failed to discover anything within the boundaries of the enclosure entitling it to the name of "Arboretum." True, detestably loose shingly walks twist like serpents throughout the space, seeking for the notable trees which ought to occupy and ornament the ground, but they wander and seek in vain. From what was observed, it would appear that this valuable site for the purposes of arboricultural science is now devoted by our economical Government to supplying the neighbouring cow-feeders with a rank crop of coarse, weedy grass. We are led to understand that this arrangement of "dirt and disorder" arises from the grasping avidity of the citizens of Modern Athens, who, it appears, supplied the funds to the extent of a few thousand pounds to purchase the ground, and on the strength of their paltry coppers lay claim to the use of it as a PUBLIC PARK, kept up for them at the expense of the nation! Why should not every town in the country follow the example of Edinburgh and get possession of property on the same easy terms? Simply because public opinion would emphatically rebel against such scandalous plunder of the national purse. It is a clever piece of financing on the part of the Edinburgh authorities, but we trust that public opinion will compel them to be more reasonable in their claims upon public charity, and insist that the ground be devoted to the purpose for which it was specially acquired by the nation, namely, the formation of an Arboretum, maintained for the purposes of science and public instruction. Under present conditions this appears to be impossible, and, if no other reasonable arrangement can be made for attaining this end, the Government should return the money advanced by the city of Edinburgh for the purchase of the property, and thus obtain the right to aid science and public instruction in a manner befitting the importance of the matter. By judicious arrangement, and under proper control, the site is

well adapted for forming and maintaining an excellent Arboretum, which would be of the greatest possible advantage to the science and education of which Edinburgh forms such a distinguished centre.

* *

We have been informed of what we trust may only turn out to be a *canard*, that the Government set so much value on their connection with the Edinburgh Arboretum as to offer the munificent pittance of £20 per annum for a superintendent or director, qualified to manage such a learned and valuable institution! We hope that for the credit of the country and all concerned, such matters as these will be treated in a wise and liberal spirit, so as to ensure the best results; but these certainly will never be obtained if the subject is approached in a niggardly and unreasoning spirit. The matter has been going on for some years now, and it is quite time that the Government saw that the direction and management of affairs were put into the hands of experienced and competent men. Until this is done, and proper funds provided for the maintenance of the Arboretum, the country cannot reap any of the benefits which it is so well calculated to confer, and which are so much wanted.

* *

We noticed some time ago the mission of Dr. Hough, Commissioner of Forests in the United States of America, to visit all Schools of Forestry, experimental plantations, and extensive *reboisements* in Europe, and report. He has now completed his tour, and has visited the Schools of Forestry at Copenhagen, Stockholm, Evois, St. Petersburg, Eberswalde, Munden, Giessen, Aschaffenburg, Eisenach, Tharand, Weisswasser, Vienna, Munich, Vallambrosa, Zurich, Tubingen, Karlsruhe, Nancy, and the Escorial, and proceeded to Gibraltar, there to embark for

America. Everywhere he has received the most courteous attention, and has been supplied with documents, statistics, and other data for an historical account of these schools, including photographs of the buildings, and in many cases of the professors. His collections, forwarded as obtained, will, when arranged, form the most extensive and complete series of reports supplying recent information upon the subject of modern forestry, that can anywhere be seen.

* *

A like tour of observation to that made by Dr. Hough, was made in 1864, by royal order of the King of Spain, by Don Maximo Laguna y Villanueva, Forest Engineer-in-chief and Professor in the School of Forestry in the Escorial. The report made by him, published in 1866 by royal order, treats of the instruction in forest science and practical forestry in Austria, in the schools and academies of Marienbrunn, Schemnitz, Weisswasser, Ansee, and Kreuz, comparing it with that given in Villaviciosa, in Spain, and suggests certain modifications in this deemed likely to be useful. It discusses also the Forest Service in Austria, Bohemia, Hungary, and Saxony, together with the instruction in forestry given in Russia, in the School of Practical Forestry in Lessino, and in those of the Steppes, and the general administration of forests in Russia.

* *

We print on another page some very interesting and instructive records of the terrible destruction to trees and plantations caused by the fearful gale on the 14th of October, furnished to us by our correspondents, or gathered from other sources; there is, however, still a great amount of damage to trees throughout the country of which up to the time of going to press we have received no account. Our best thanks are due to those who have so kindly and

promptly replied to the circulars which we issued at short notice and to others who have voluntarily sent us reports.

* *

From a host of correspondents we have received inquiries as to the possibility of raising some of the fallen trees which were uprooted by the great gale on the 14th ult., and we take this method of replying to all, that it is a matter of common practice and success, if set about in a proper manner. In the first place it must be considered whether it is worth the cost to raise any tree, and, when that is decided in the affirmative, no time should be lost in carrying out the work. In such operations none but *thoroughly skilled and competent men* should be employed to direct the work. The neglect of this is a fertile source of failure, while under the supervision of an experienced and careful man success is a certainty. Some trees, such as oaks, limes, birch, conifers, hollies, yews and the like, which are generally over-turned with large balls of earth attached to their roots, are much better adapted for raising than others. If the roots are in fair condition, and the tops not too much mutilated, these trees lift with the greatest ease and success. For other remarks respecting this subject see our reply to Lord Middleton at page 526 of this number.

* *

In our notice of the Forres Nurseries last month (page 432) we by inadvertence named Mr. Sim (who is owner of another nursery at Forres) as the manager, instead of Mr. McIntosh, to whom the members of the Excursion were indebted for much kindness and courteous information during their short stay at Forres.

* *

Every now and again we are entertained, and occasionally instructed, by articles appearing in the daily papers on various topics relating to trees, and their use in the embellishment of our cities and suburbs.

Generally written in an attractive and popular style, so as to meet the capacity of the ordinary reader, they are not always models of technical knowledge, and often display a want of practical acquaintance with the subject in hand. From the nature of things this is about as much as the public can reasonably expect from the ordinary writer for the daily press; and errors arising from this cause are usually treated as beneath the notice of those who are practically and technically versed in the subject. A long article of this nature, entitled "Trees About Town," recently appeared in the *Standard*. It was probably read by thousands of people, who would never have gone farther than the first few lines had the writer confined himself to purely technical definitions and practical suggestions. Drawing somewhat upon fancy and imagination, he combined flowers, and birds, and trees, and other objects of nature in such pleasing fashion as to rivet the attention of the most careless reader. He thus enlists their tastes and sympathies in a love for trees and the choicest gems of animated nature, which fairly condones in a newspaper for errors of a purely technical type. Yet, for all this, a usually staid horticultural contemporary goes out of its way to gibbet the author as a writer of "burlesque"! Perhaps our horticultural friend intends the silly criticism in which he indulges on "Trees Near Towns," as he erroneously styles the article, to be *only a burlesque*, and we will therefore charitably dismiss him with a caution to avoid in future that class of literature in which he certainly does not shine.

* *

During the continuance of open weather every planter ought to make the greatest efforts to get as much of his work completed as possible, before keen frost and snowstorms come to put an end to planting operations till the spring. The great advantages of autumn planting have been so often dwelt upon in these pages that it is

unnecessary to recapitulate them at the present time; but we would strongly urge on the attention of our readers who have planting operations on hand the urgency of pressing on the work during the earlier part of the month, while there is still a fair amount of light and warmth, and when the roots of trees take readily and kindly to the fresh soil. Generally speaking, October and November are the best months in the whole year for planting trees, and there are but few places in which it cannot be more successfully carried out at this than at any other season, if due attention is given to the subject and the necessary arrangements made in time.

* *

Our readers will observe by a notice in our advertising columns that the Educational Committee of the Scottish Arboricultural Society is anxious to get a complete return of answers in reply to the queries which it addressed by circular to those chiefly interested in the formation of a School of Forestry. We are sure that every forester and member of the Society who has received a circular from the committee upon such an important subject will at once fill it up and return it to Mr. McLaren, as requested in the advertisement. Much good may result by their doing so promptly.

* *

We much regret to hear that Mr. John Keillor, Forester on the Drummond Castle estates, in Perthshire, of the Baroness Willoughby d'Eresby, has lately had to leave after a service of thirty years. Such an able and experienced forester would be an acquisition on any well-managed estate, and we hope that Mr. Keillor will soon meet with an engagement worthy of his skill and sterling merits.

* *

Miss Ormerod delivered a very interesting lecture on "Injurious Insects and Farm Crops," before the students at the Royal Agricultural College, Cirencester, on October 20.

The lecture was most cordially received by a full body of students, amounting to about 80 or 90, and some of the neighbouring residents interested in agriculture or connected with the college, amongst others Earl Bathurst and Mr. Elwes.

* * *

We have received a few samples of wood labels, made by Mr. Henry Bradley, of Southwell, Notts, which appear to us to be peculiarly well adapted for naming trees and shrubs in the nursery, arboretum, or ornamental grounds. They are made of various well-seasoned woods—among others of oak, beech, box, pine, and holly—and being neatly designed and the names stamped on them, they ap-

pear to possess several qualities which recommend them in preference to iron and other weighty and brittle materials. To render them more durable, they are steamed and then lettered, and afterwards steeped in oil and varnished, which renders them as lasting as wood can be made. For hanging to trees they are neat and light, and the lettering is clear, durable, and easily read. Their lightness causes less friction on the shoot to which they are hung than metal labels. Although by no means absolutely perfect as a label, still we consider that in most points they are a great advance on those in ordinary use, and being produced at a cheap rate they are sure to command a ready sale and give good satisfaction to the purchaser.



THE BIRD CHERRY.

SIR,—In reading over the annual trip of the "Scottish Arboricultural Society" in the Sept. *Journal*, I was struck with the large size the Bird Cherry (*Cerasus Padus*) had attained along the banks of the Findhorn River, and as I have never seen any over 30 ft. in height nor girthing anything like what is mentioned there, I was under the impression that perhaps a mistake had been made in confounding this with the Gean or Wild Cherry.

Strange to say, Grigor, in his work on Arboriculture, mentions the Gean tree as growing luxuriantly along the banks of the Findhorn.

I should be obliged by your letting me know, as great difference of opinion exists as to the size attained by the Bird Cherry.

ANGUS D. WEBSTER.

Llandefai, Bangor, N. W.

[The sizes of the Bird Cherry (*Cerasus Padus*) on the banks of the Findhorn in some instance exceed the figures given in the report in the *Journal*. There is no mistake about the matter. The Gean (*Cerasus sylvestris*) is also abundant, and is, of course, much greater in dimensions, growing alongside the Bird Cherry. Both are remarkable for their size, but the Gean is often seen elsewhere as big; but we never saw the Bird Cherry generally so large.—ED.]

THE CEDARS OF LEBANON.

SIR,—In this month's number of your most interesting and valuable *Journal*, I this morning read your note regarding the celebrated Cedars of Lebanon, in which you state, quoting from an Austrian paper, that this famous forest, formerly so extensive, has dwindled down to the

dimensions of a mere thicket, numbering about 400 trees.

This evening's post has brought me a letter from a Syrian correspondent, Dr. Carslaw, of Shweio, in which occurs this account of an excursion, which I am sure will be interesting to you and to all lovers of arboriculture. "We passed," he says, "through the eastern part of the Kesrawan on our way to the Cedars, and on returning by way of Duma and Isbail, we passed through an immense forest of Cedars about four or five miles long, by three or four in breadth. They were true Cedars, but comparatively young trees. The people cut them down for firewood, leaving the stumps in the ground, from which new branches spring. I saw one old stump with six branches, each of which was about twenty-five or thirty feet high."

WILLIAM FERGUSON.

*Kinmundy, near Mintlaw,
Aberdeenshire, Oct. 4, 1881.*

RAISING FALLEN TREES.

SIR,—I regret to say that three of the great limes in the Birdsall Avenue, about which there was a correspondence in the *Journal of Forestry* very lately, fell in the great gale of October 14. The gaps in the avenue are so unsightly that I am trying to put them up again. One has already been raised (denuded of its head), but still stands at a height of 80 ft. I would like to know if the sap will rise to that height, or if it would be best to cut them off shorter? Should they be ordinarily propped? or should loads of stones be laid on the roots of the replanted trees?

Can you or your readers give any advice or information on the subject, or are there any instances on record of replacing such very large trees?

MIDDLETON.

Birdsall House, York.

[We are exceedingly sorry to hear that the splendid lime-tree avenue at Birdsall has suffered so greatly in the general wreck wrought by the terrible gale of the 14th ult. of which such disastrous accounts appear in our present issue. Amid the general ruin, we are glad, however, that our correspondent and many other proprietors are so anxious to do all in their power to retrieve their heavy losses among ornamental and remarkable trees.

With care and proper appliances almost complete success will crown their efforts to restore to an upright position and healthy growth any blown-over trees which are not so completely smashed and torn as to be beyond all hope of recovery. Such fine lime trees as Lord Middleton mentions are generally good subjects to erect again after being blown over, and we anticipate the result will be a complete success, even although the trees are unusually large and high. In a lime we fully expect the sap to rise to the top of the cut-back head, 80 ft. from the ground, and to see the branches burst into growth and leaf with the return of spring. This, of course, can only result if the roots are not too much reduced and mutilated by the upset the trees have had; but that is not the usual case with limes, which generally raise a large ball of earth with their roots when blown over. It is not easy to prop up such trees effectually. Staying with guy ropes is the best method where it can be adopted, taking care they reach to a proper height, and do not chafe the stem where they girth it. Strong hooked wooden pegs, driven well into the ground to hold down the principal roots, is also a good method, when the trees are not heavy in the tops; and under the same conditions stones laid on the surface of the ground, over the roots, are also effective. In all cases before erecting the tree a proper preparation should be care-

fully made for the roots, and where the soil and surroundings are favourable the subsoil should be taken out, so that the tree may stand six inches to a foot deeper in the earth than before it was upset. Except in stiff clay and wet soils, this is much preferable to raising the earth around the stem of the tree above the natural level of the ground. In reference to instances of large trees being erected after being blown over, they are to be met with in many parts of the country, and we have successfully performed the operation ourselves with various descriptions of trees, large and small. With competent skill, there is no fear of the good result.—
ED.]

TREE PRUNING.

SIR,—I hardly think in M. Des Cars' article on tree pruning, he insists sufficiently on the necessity of covering with coal-tar, or some equivalent for it, any *large* wound caused by amputating branches perfectly even with the trunk. I confess I think it preferable to amputate such large branches just above their first side-shoot. They then never die bark, but usually send out a brush of young wood, and after a year or two may generally be cut further back, to the nearest of these young shoots to the stem. There is a little unsightliness in this system of pruning, but it is safer than amputating close to the trunk when the wound is of a size that will not heal over in two or three seasons.

Five or six years ago, the branch of a Scotch elm which I had thus shortened, was, during my absence from home, sliced off even with the trunk by an over-zealous dependant. The wound was not coated with tar or any other composition, and the bark has not yet closed completely over it. Last year a huge fungus grew from the orifice, and on removing it I found the stem of the tree at that point quite decayed; this

year the fungus grew again. The tree, which before was vigorous and healthy, is now going back, and as it is only forty or fifty years old, I impute this entirely to pruning off "perfectly even with the trunk" a branch of too large a size for that system of treatment. In an oak a larger branch may be safely taken than can be done in an elm, because the wood better resists decay. The application of coal tar to the wounds of soft-wooded trees will probably help to keep the wood in them sound while the bark is healing over; but where sightliness is not of first importance, I prefer shortening overgrown branches to taking them off by the stem, if they are more than an inch or two in diameter. Very likely the system advocated would not have the same danger in a drier climate than it has here, but for Scotland, I venture to think, it can only be recommended in conjunction with the coal tar.

KENNETH S. MACKENZIE.

NURSERY TREATMENT OF PLANTS.

SIR,—I enclose a short report of damage done by the gale of the 14th. I think it would be well if you would invite (through your Editor's Box) foresters, and readers generally, to give their opinion as to the nursery treatment of plants, as I consider it a very important question; and the system of elaborate nursery treatment is fast growing to be pernicious to the ultimate well-doing of the trees. Of course for shrubs and fruit trees, and in any case where foliage is wanted, transplanting is the proper course; but my experience teaches me that seedlings *only* (not transplants) should be used for the formation of plantations of forest trees, and even seed itself, in very exposed situations.

Altogether I consider the subject is one worthy of attention

being directed to it, and by your so doing I have no doubt it will meet with the attention of the most experienced foresters in the country.

D. F. MACKENZIE.

Murtly Castle, N.B.

[We consider Mr. Mackenzie's suggestion a valuable and opportune one, and in view of the disastrous effects of recent gales, we hope it will be taken up, and the subject dealt with by some of our correspondents. —Ed.]

LARGE WELLINGTONIA GIGANTEA.

SIR,—In your article headed "The Forests of Darnaway and the Woods of Altyre and Brodie," you give particulars of three or four fine specimens of the *Wellingtonia gigantea*, which much interested me, and I was thereby induced to measure what I consider to be a very fine specimen of that noble tree, which stands on the lawn here.

The measurement is as follows:—height 55 ft., girth of bole one foot from the ground 10 ft. 10 in., girth of bole four feet from the ground 7 ft. 6 in., circumference of the lower branches resting on the ground 71 ft.

W. MANNING.

*The Gardens, St. Mary's,
Amport, Hants, Oct. 15th.*

THE DEVELOPMENT OF ROOTS.

SIR,—I have already stated in the pages of this *Journal* that too elaborate nursery treatment is detrimental to plants, so far as their "fixity of tenure" is concerned, and that the smaller the plants are, when planted out, the better they are able to withstand the wind when grown, their roots being stronger and better developed. Two essays on this subject will appear in the next part of the *Arboreal Society's Transactions*; in which I have little doubt but that

the writers have thrown some new light upon this subject. Still, it is a proper, and very good subject to have debated in the *Journal of Forestry*, and it is to be hoped that those who may have made observations of the kind will kindly communicate them, in order to lessen as much as possible the continual recurrence of the blowing down of unripe timber.

D. F. MACKENZIE.

Murtly Castle, Perthshire.

INSECTS ATTACKING SCOTCH FIR.

SIR,—I herewith enclose a specimen of the insect that at present is infesting some of the fir trees on this estate. Since I wrote you last month a few more cases have occurred, and those are on Corsican and Austrian pines. The Scots fir, where I first observed the insect, are now very naked of leaves and unsightly. The enclosure of trees attacked was planted in 1872, for the embellishment of the policies, and it is composed of larch, Scotch fir, silver fir, Corsican and Austrian pines, and the leading kinds of hardwoods. Some fine specimens of *Picea Nordmanniana* are also planted in the enclosure, and are doing very well. A fine grass walk runs through the enclosure, and is much frequented by the family during the summer when they reside on the estate. I will be glad if any of your readers can suggest a remedy. As I said in my last letter, I do not in all my travels recollect seeing any kind of insect such as I have sent, but this might arise from the fact of my being employed in plantations that might have been clean.

THOMAS DOW.

West Idvies, Oct. 14, 1881.

[Our correspondent's Scots fir and pines are infested by the caterpillar of the Pine Saw-fly (*Lophyrus pini*), which has been abundant in Scots fir plantations in Scotland for

some years. We would strongly recommend a perusal of Miss Ormerod's recently published book, "Manual of Injurious Insects, and Methods of Prevention," by our correspondent, where he will find the latest information on the best modes of prevention and remedy, as practised and recommended by foresters and others possessing experience of the pine saw-fly and its ravages.—ED.]

HOME-GROWN TIMBER.

SIR,—Having had occasion lately to visit some of the principal timber yards in London, I had some conversation with the merchants as to the uses and prices of home-grown timber, but to all of them the very mention of English timber was enough, it stinks in their nostrils. The principal reason of this seems to be the want of room for the unconverted stuff;

they consequently prefer foreign, which, of course, is imported in a converted state, and only what is fit for the trade. It is therefore matter for consideration for the home growers of timber to find a more ready market for their produce than at present, for it must have occurred to sellers that the majority of buyers only want a certain class of stuff in a lot, and that the price paid is only for that, while the rest must be thrown into the bargain. An association of growers should be formed, with a central mart, where the timber could be classified and converted for the different purposes of the trade, and in this way they would be able to compete on more equal terms with foreign produce, and it seems to me that we want this to bring English timber more to the front.

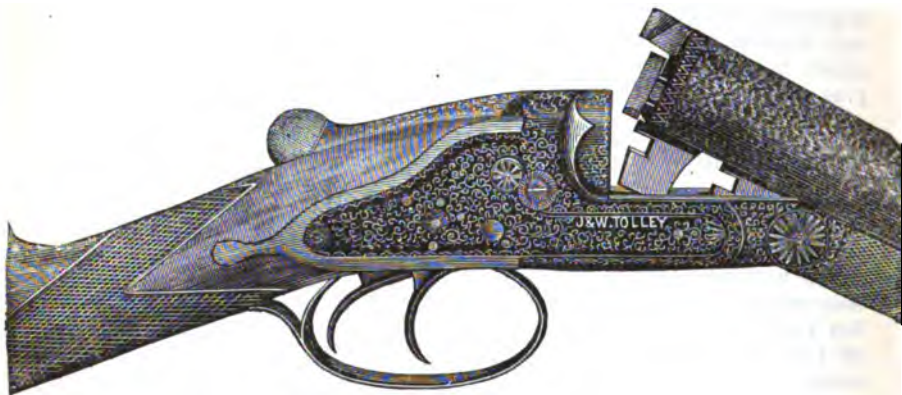
CIRCULAR.

J. AND W. TOLLEY'S GUNS.

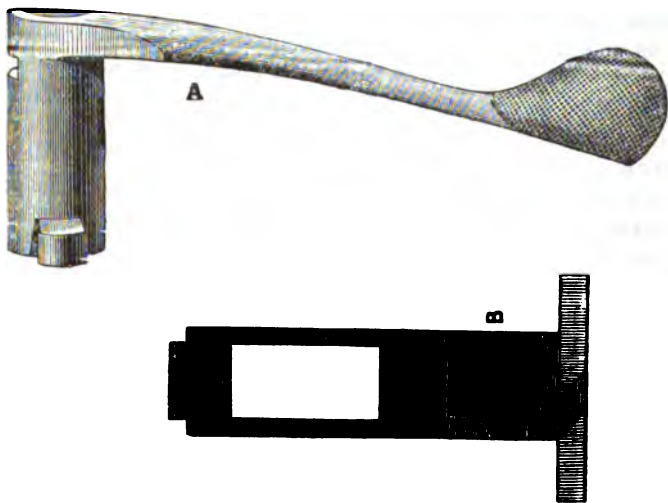
THERE is perhaps no class more interested in guns and more desirous of being fully informed of all the latest improvements than the country gentlemen and landed proprietors who compose a majority of the readers of this *Journal*. We have therefore thought it would be interesting if we gave some information to our readers respecting the weapons used in field sports, for covert shooting, and for guns and rifles specially suited to the requirements of those who are engaged in the conservation of forests. We propose therefore to review in a short but, we trust, an interesting article the products of the manufactory of a firm of gunmakers that occupies a foremost place in the supply of weapons of high quality to the class of English and Colonial gentlemen who have opportunities for sport in our own country, in India, and the Colonies.

We have had our attention arrested recently by the illustration of a new hammerless gun, built by Messrs. J. and W. Tolley, of the Pioneer Works, St. Mary's Square, Birmingham, and as this gun, "the Perfection," seems to us to meet most or all the objections taken to the hammerless principle, we have thought it worth while to ask Messrs. Tolley to give us, for the purpose of this article, the detailed information, drawings, &c., necessary to a clear understanding of the principle of this gun. We have fortunately to do with a firm of manufacturers who add to the practical knowledge of detail, which as manufacturers is essential to the conduct of their business, an amount of scientific information that has made our task an easy one. Messrs. Tolley have most courteously placed at our disposal all the information necessary

for our present purpose, including drawings, complete and in section, of what these makers claim is *the* gun, combining in the greatest degree the advantages of the hammerless system, while avoiding the faults that were at first apparent in guns on this principle, and some of which faults are almost inevitable in a new idea somewhat complex in its nature, and which are only to be discovered by experience.



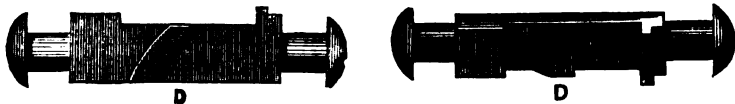
Messrs. Tolley say, in introducing this gun, that it was invented and patented by them for the purpose of bringing before gentlemen a hammerless gun, containing all the advantages claimed by the best systems, getting the same results, with much greater simplicity and less complication. It will be found to contain all the essentials of a



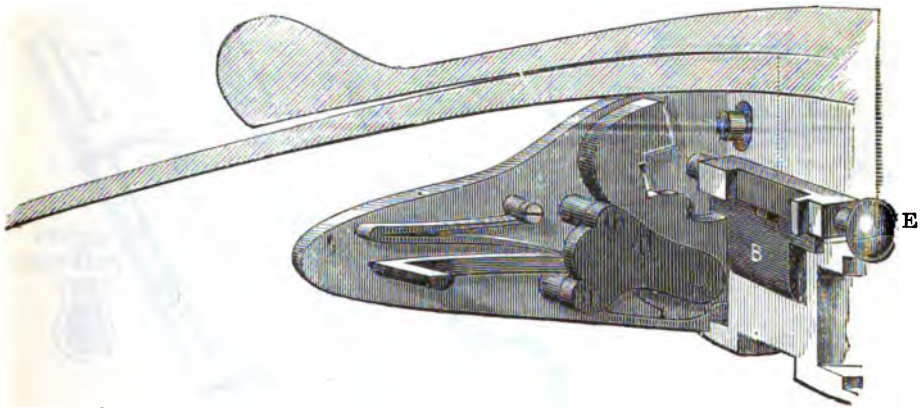
really first-rate hammerless gun, viz. :—1st, Opening with the lever, and *not* with the barrels ; 2nd, safety-bar in front of hammers working automatically or independently as may be desired ; 3rd, ordinary gun-locks free from all complication ; 4th, top-lever action and extended rib ; 5th, easy manipulation, free from that disagreeable stiffness so common in most hammer-

less guns; 6th, greatly improved appearance, contrasting most favourably in this respect with many of the hammerless guns now in vogue. This gun, we are informed, has been very favourably received, and its success may in great measure be attributed to its perfect safety-bar, its simplicity, and to the handsome contour customary in high-class guns having been retained.

By the aid of the annexed sectional view the action of the gun will be easily understood; indeed, we consider its simplicity a great point in its favour. A is the thumb lever which withdraws the bolt; B is the bolt, with lateral projections at the base resting on the breasts of the hammers, and which force the locks to full cock, as the bolt is withdrawn in opening the gun; and, at the same time, the safety-bar, D (which has a diagonal stud



on its surface, fitting a corresponding slot in the base of the bolt B), is forced into position automatically. We thus get by the one act of opening the gun:—(a) the breeches exposed to receive the cartridges; (b) the locks placed at full cock, and (c) the safety-bar put in position, and *interposing between the hammer heads and the strikers*. The gun can now be loaded and closed for firing; but before the cartridge can be fired it is necessary to remove the safety-bar, which is done by pressing the button E home on



to the left lock plate, when the gun may be fired. The important point in a safety-bar is to make it so as to be released only by a separate and distinct act, and *altogether independent* of the triggers, as a large proportion of the accidental discharges of firearms arises from the trigger being pulled either by accident or inadvertence. If by any chance the hammers were to be released from full cock, and were to fall down on the safety-bar, no accident can occur, as the safety-bar can only be removed when the locks are at full cock. The locks are the ordinary gun locks, but with inside hammers.

We think we have put before our readers such particulars and illustrations as will enable them to get a pretty clear notion of this new principle as displayed in one of the most successful guns of the day.

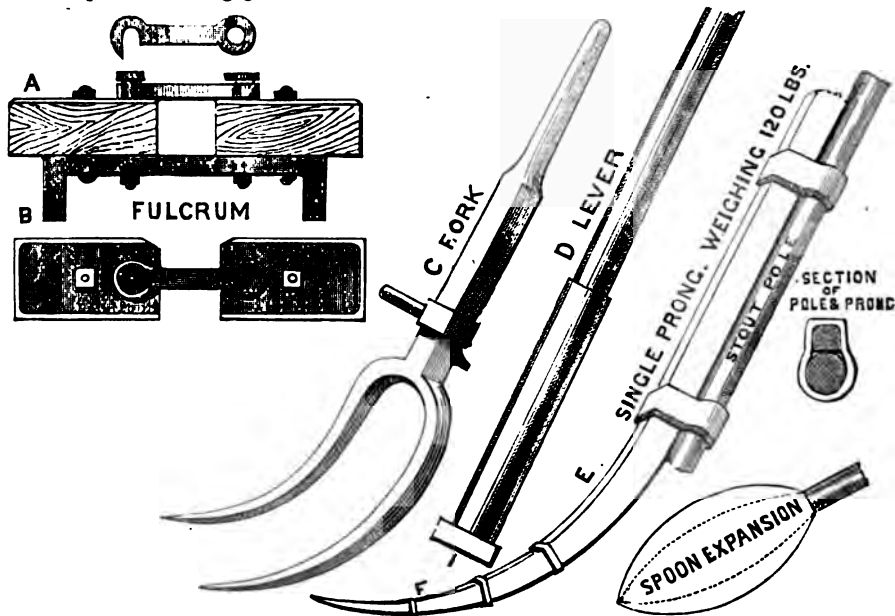
On a recent visit to their works we found that Messrs. Tolley were engaged in building guns and rifles of all out-of-the-way kinds for every description of sport. We saw a large selection of wild fowl guns. One notable gun that we saw impressed itself on our memory as a gun of enormous power; it is a 4-bore breechloader, using 9 drams of powder and $3\frac{1}{2}$ oz. of shot, and by the aid of sights for two ranges (as in a rifle) we are informed it is effective at a flock to 150 yards. These wild fowl guns run from 10 bore to 4 bore, which is the largest manageable shoulder gun.

We were much interested too in the large bore double rifles, for elephants, rhinoceros, &c., as well as the even more useful "Express," of which we saw some beautiful examples. The inspection of these weapons, with the different conical shells and bullets, some of them armed with a steel point, to penetrate the cuirass of the harder-skinned animals, made our visit to "Pioneer Works," Birmingham, one to be remembered, and it was with regret we took our leave of these fascinating appliances.

—:O:—

THE PATENT TREE LIFTER.

A NUMBER of machines have been patented from time to time intended for transplanting large trees, some of which are capitally adapted for doing good work; it must, however, have occurred to every one



intrusted with the care of plantations that there is a want of some mechanical assistance for moderate-sized trees and shrubs which although too big to be moved with the spade and the hand, are yet not sufficiently bulky to require the use of a transplanting machine. It is for this class of work that we consider the instrument illustrated above particularly suitable, and a brief

description of it will probably induce many of our readers to give it a trial.

We learn from the inventor, Dr. Newington, Ticehurst, Sussex, that by means of this instrument conifers, forest and fruit-trees, as well as shrubs of considerable size, can be lifted from the ground without injury to the roots, in two or three minutes. A larch 16 ft. high was brought clean out of the ground, with roots from 3 to 4 ft. in length, in the space of two or three minutes, and an arbor vitæ 10 ft. high, which had been growing in the same place for six years, was uprooted in about the same time.

The following are instructions for using the implements.

Place the fork C at from 2 to 3 or 4 ft. from the trunk of the tree, take the handle in the hands and move it from side to side, and backwards and forwards: this movement will cause the curved tines to penetrate under the trunk of the tree; now slip on the tubular lever D, and if the tines have not penetrated deeply enough, put the foot on the treadle and move the fork again as before. A spit of earth is to be removed from the back of the fork. The fulcrum A B is now to be placed on the earth near the shoulders of the fork; the upper bar of the fulcrum is to be thrown back so as to allow the handle of the fork to rest upon the lower bar. Now weigh down the lever so as to displace the roots of the tree, then lift up the lever, shut the upper bar of the fulcrum, and weigh the lever on this upper bar, when the ball of earth, the roots, and the tree will be suspended high enough to allow of an iron plate, or trolley, being drawn under the ball. It is a good plan to place fine mould round the fibres of the roots when planting.

Two tree-lifters may be used with great advantage when the trees are large. Three have been used for balls 7 ft. in diameter. The spoon expansion, made of Whitworth steel, is affixed on the large prong F E for lifting large specimens.

Mr. J. Charlton, Parade, Tunbridge Wells, has been appointed the agent for this implement. The price of the 40 lb. Lifter, complete, is £2 15s; a smaller implement, for plants from 5 ft. to 6 ft. in height, is sold, the price of which is £2 2s. complete.

OUR FOREIGN EXCHANGES.

FROM Italy have been received successive numbers of *L'Adriaticos Gazzetta del Veneto*, containing notices of the late Geographical Congress in Vienna; *Diario* No. 6, of the Congress, containing *in extenso* the inaugural address delivered by M. Lesseps; *Elenco delle questioni*, or list of questions submitted to the Congress, with documents relating thereto; and *Appendice alle relazioni*

publicate insieme, &c., an appendix to the last mentioned.

In regard to the Exhibition opened in connection with the Congress, it is reported in *El Porvenir de la Industria*:—France has distinguished herself by her Cartographic and Ethnographic exhibitions, also by the products of private enterprise, more especially in Maps of the World. Greatly to be commended is the

exhibition by Spain, and particularly admired are her new military maps. Egypt has awakened a lively interest by her exhibition of objects brought from the interior of Africa, and especially by the collection of the traveller Geasi. Austria exhibits magnificent military maps. Germany is distinguished by her instruments. Russia by school, ethnographic, and military maps. England by her instruments, her maps, and her collection of Observatory Records from India. Belgium by her educational works, and her military maps.

From Italy have also been received notices of various preparations, hygienic and antiseptic, made by the friars of Saint Paul, Irois Fountanes, from the Blue Gum, *Eucalyptus globulus*, now planted with beneficial results around their monastery, which was once uninhabitable during night, and also along various lines of railway in Italy, as a preventive and counteractive of malaria.

Anxiety in regard to ravages committed by the *Phylloxera* continues to affect many connected with vine growing, and students of forest science are giving attention to allied species which affect forest trees. The *Revista de Montes*, of Spain, calls attention to a paper on the biorological evolution of the *Vacuna alni*, Schrank, presented to the Academy of Science of Paris, by M. J. Lichenstein. In this paper the author says (I translate from the Spanish):—

"Amongst the aphides are comprised a small group of insects which are distinguishable at first sight from all the others by the aspect presented by its wings, which do not form a kind of keel, but are flat on the back, as is the case in most of the coccidios.

"The *Phylloxera* is the best known type. For the last ten years I have traced the cycle of evolution of this genus, as seen in the *Phylloxera* infesting the oak, with two wingless and two winged forms, and in that infesting the vine with three wingless and only one winged form.

"Besides the genus *Phylloxera* which has only three joints in the antennæ, there

are only two others which have the wings flat, they are the *Aplonoura*, which has six joints, and the *Vacuna*, which has five.

"There is only known one species of *Aplonoura*, that infesting the mastic (*A. lentisci*); but I have discovered another in the roots of *gramineæ*, and I consider this is another form of the *lentiscus*, indicating a migration of it to the grasses, such as is the case with the oak *Phylloxera* migrating from the white oak to the evergreen oak, and *vice versa*.

"What was further required was to study the *Vacuna*, of which there are known two species, *V. dryophila* found on the oak—and *V. alni* found on the alder and the birch.

"The *V. dryophila* lives on the evergreen oak and on the white oak, but we have not been able to prove a regular migration; but at any rate, in December, a winged form shows itself on the leaves of the white oak (*Quercus pubescens*) and gives rise to individuals of both sexes, which after transformation have connection. This winged form is that which is called *Pseudogynia pupifera*. The fecundated female lays around the buds of the oak eggs of a brilliant black colour, without any covering matter, which hatch in spring.

"The *Vacuna alni*, according to authorities (de Gier, Kattenbach, Koch), is born in spring in the form of a green louse, and produces its young, which acquire wings in June. I do not know these two forms which are given as *Pseudogynas fundadoras*, and *emigrantes*, but in July I found in Luchan a large wingless louse of a red brick-colour, with a medium line and four white folds which lay along the trunk, and below the leaves little ones of a green colour, and of two different sizes. Familiar with these two wingless sexual forms, I immediately suspected that this large louse was the former, *pupifera*, notwithstanding its being wingless. And it proved so, a few days thereafter; and after a few changes had passed upon them I saw the small ones become active males, which ran to the females, and meeting them fecundated them. The *Pseudogynia pupifera*, wingless and red, were about 1.1 mm. in length, the former grew 1 mm., and soon through its transparency was seen a large egg in its abdomen. The male taken as grown was 0.66 mm. in length, and compressing slightly the abdomen, the penis was protruded, and was of the constant form of that of the aphides.

"After copulation there appeared in the female, on both sides of the abdomen, a brilliant secretion of pearly white colour, which indicated that it was about to lay, and after two or three days it did so, and covered the egg with this pearly substance, not as a filamentous covering, but in the form of small scales. The egg could pre-

viously be seen situated above the operculum, leaving the extremity mobile.

"The discovery of the sexual forms of the *Vacuna alni* completes the knowledge of these forms in all the known species of aphides, which have flat wings.

"In the *Phylloxera aptoneura* the sexed forms have no rostrum, but nevertheless they go on increasing in size, and experience at least one, and in some cases more changes. The genus *Vacuna* have one and feed. In this respect they approximate to the genus *Schizoneura*, in which a great many species have rostrated sexed form. It is at the same time curious to see in the Genera *Vacuna* and *Phylloxera* species, of the form *pupifera alada*, alongside of others of the form *pupifera aptera*. But in any case nothing would be more erroneous than to reason by analogy in regard to these remarkable animals.

"We see two *Vacuna*, one beside the other; we see them produce the same insect, but the one does so in June and the other in December; the one takes the form of a wingless *pupifera*, and the other that of a winged one; the one produces no secretion, the other exudes, one of pearly white!

"We yet desiderate sufficient observations to warrant us to attempt the classification of the aphides in respect to their biological development."

In the *Revue des Eaux et Forêts* appears an interesting paper by M. Prideux, on the influence of frosts on plants.

In the *St. Petersburger Zeitung* is given a commendatory notice of *Der Wald geschildert* by E. A. Rossmässler, of which a third edition, revised by Herr M. Willkomm, has lately been published in Dreden.

JOHN C. BROWN.

TRADE LISTS.

FOREST AND ORNAMENTAL TREES AND SHRUBS.

OF the numerous trade lists of Hardy Trees and Shrubs which annually appear at this season, one of the most useful and interesting is that issued by Messrs. Veitch and Sons, of Chelsea. Their catalogue of these plants for the ensuing season is, as usual, very complete, and comprises—besides lists of all the ordinary kinds of hardy ornamental trees and shrubs, conifers,

forest trees, American plants, and plants adapted for special purposes—fully detailed descriptions of new and choice conifers, maples, oaks, magnolias, and other select trees and shrubs, including the recently-introduced species of these from Japan, all of which are of an exceedingly interesting and ornamental character, and most of them are likely to prove perfectly hardy in this country. Every lover of new and rare trees of the choicest kind should procure a copy of Messrs. Veitch's lists, in which they will find much of an interesting nature, in connection with choice and rare ornamental trees and shrubs.

The Nurseries of Messrs. John Waterer and Sons, at Bagshot, Surrey, have long been famed for the excellence of the American plants—especially rhododendrons—which are raised there on such an extensive scale, and which find their way, through the enterprise of the firm, to every part of the country. Their recently published catalogue gives a full description of the several classes of these very interesting plants, besides useful lists of choice conifers and other ornamental trees.

One of the most useful catalogues of the season, especially to foresters and others who buy trees in large quantities, is that published by Mr. James Smith, Darley Dale Nurseries, Derbyshire. Along with many valuable hints and remarks about the various kinds of trees and shrubs, it gives the botanical and popular names, the heights of the different kinds of plants, and their price, per thousand, hundred, dozen, or each, as the case may be. It thus serves the purpose of a ready reckoner to the planter, who can easily calculate from its figures the cost of any number of plants, from which to form his estimates with accuracy and dispatch.

Among others we have received the following catalogues of forest

trees, conifers, hardy ornamental trees and shrubs, and plants of a similar nature, interesting alike to the arborist, and the practical forester. "Forest and Ornamental Trees, Fruit Trees" &c., by R. and A.

Morrison, Elgin, N.B.; "Forest and Ornamental Trees and Shrubs," &c., by Stuart, Mein, and Allan, Kelso, N.B.; "Ornamental Trees and Shrubs," J. Cheal & Sons, Crawley, Sussex.



THE NEW FOREST.—The beech and other trees in the New Forest have presented a splendid appearance during the past month, with the autumn tinge on their leaves, and those who have forest rights have been busy in cutting the fern and getting it in. Acorns seem tolerably plentiful, but the beech mast is a very poor one indeed.

WOODEN HOUSES.—A correspondent of the *Field* writes that he had a wooden house built three years ago by Messrs. Lascelles, Bunhill Row, London. The house is thoroughly warm, dry, and comfortable, built to plan at a moderate cost, and at a very short notice. It was easily put up by local workmen, directed by a foreman of Messrs. Lascelles, in about five days, including all fittings, as stoves, &c. He speaks highly of the way in which the plans were carried out, and all the work executed, both as to finish and quality of timber.

A LANDOWNER'S EXPERIMENT.—A Gloucestershire nobleman, owning vast estates, is making a novel experiment to render land more remunerative. He has planted thirteen acres with gooseberry and currant trees, eleven with strawberry plants, and thirty-five acres with plum trees, while a large portion of the park and wood of two hundred acres has been converted into rabbit warrens, and surrounded with iron fencing. The erection of a jam factory is contemplated.

GREASE FROM TREES.—Large forests of a peculiar tree called the "grease tree," are said to grow in China, and to have been cultivated to some extent in India. The grease forms the source of a considerable local trade. It is believed to be very valuable as a lubricant, and a chemist in the Punjab has taken

measures to have its qualities thoroughly tested on railway machinery especially exposed to friction. The grease forms an excellent tallow, and burns with a clear and brilliant white light, without emitting any unpleasant odour of combustion.

A GIANT APPLE TREE.—At Barleythorpe, in Rutlandshire, a huge apple tree, 24 yards in diameter, is a very attractive sight at the present time. The tree has lost one of its main limbs, but the loss is not perceptible at a distance. The tree has to be supported under the weight of its crop, which is something extraordinary, and which is the best example of apple growing I have ever seen upon a lawn or anywhere else.—W. H., in the *Gardener's Chronicle*.

THE OAK FERN.—From the slender-branched perennial caudex of the oak fern arise three-branched fronds from 4 to 12 in., or even more, in height, and about half as broad proportionately, including the stipes. In vernal the fronds present a curious appearance, each branch forming a compact little ball, apparently supported on green wire; when the fronds unfold they are of a pale but very exquisite green, and this is perhaps the greatest charm of the plant.—From *European Ferns*.

ABIES CAROLINIENSIS.—A new hemlock spruce has been discovered in the Carolina Mountains, and described under the above name by Dr. Engelmán in the *Botanical Gazette*. Mr. William Canby, who has been south this summer, has also collected specimens. It is remarkable that large trees like these should so long have escaped the botanists who have been over the field.—*Garden*.

THE JOURNAL OF FORESTRY & ESTATE MANAGEMENT.

*THE FOREST AND CHACE OF MALVERN.**

CHANGE has passed upon the country once designated as "Malvern Chace" since its disafforestation in the reign of Charles I., when the "beasts of venery" strayed over its unenclosed woods, and when the neighbouring occupiers of land were compelled under the forest laws to submit to the visitations of stray deer without daring to prevent their trespasses, and a court sitting at Hanley had jurisdiction over all matters appertaining to the Chace, while the chief forester's axe was at times brought down upon the neck of any unfortunate marauder who could not show good cause for being found within the sacred pale of "the said Chace." But almost to the close of the last century the Chace was a great unenclosed waste, for in the memory of men living but a few years since a person could have ridden on horseback from Great Malvern to the top of Bredon Hill and found no impediment to his course save only the passage of the Severn, and that could be crossed at Upton Bridge.

It is scarcely possible to form an adequate idea of the appearance of the Forest of Malvern in the early times prior to the Norman Conquest, but at that period the monkish chronicler, William of Malmesbury, mentions it as "a wilderness thick set with trees." Previous to that time the whole country from the hills to the Severn must have been a waste tract, fit only for the lair of wolves and other savage animals; and in places not covered by trees or underwood, except where a few bare eminences like the Wold Hills contrasted with the gloomy forest scene, was a flat marshy expanse with difficulty explorable by day, and a dangerous extent of immeasurable gloom at night. This tract of land west of the Severn was included in the country of the Silures, but it was probably only visited on hunting forays, for no traces have been discovered of any permanent occupation, and scarcely a single British implement has been anywhere

* This article is abridged from a very interesting little book on the subject (published in 1877) by Mr. Edwin Lees, F.L.S., F.G.S., Vice-President of the Malvern and Worcestershire Field Clubs, to whom we are also indebted for the loan of the illustrations.

exhumed, nor are memorial stones or sepulchral barrows to be found. Very few Celtic names remain in the district, and with the exception of Malvern, and perhaps Pendock, all the names of parishes are evidently of Saxon origin. Nor did the Romans mark their presence visibly in the flat country between the Malvern Hills and the Severn, for no decided Roman road crosses the Chace, nor have any Roman remains (a few coins excepted) been found in it except near Upton, where there seems to have been a camp, or secondary station, probably to guard the ford across the Severn; and another Roman or rather auxiliary camp existed at Kempsey, four miles below Worcester, but this was on the eastern bank of the river. The Saxons do not appear to have entirely conquered the country between the Severn and the Wye before the reign of Athelstan, and whether they did much more than divide the Chace into parishes does not clearly appear. Some grants of land were probably made by Saxon kings, and Edward the Confessor exercised that right; but the greater part of the Chace must have been unappropriated, and as forest ground was therefore seized upon by the Norman sovereigns.

The distinction between a forest and a chace is that the former was royal property, but the latter could be held by a subject. Tanner, alluding to the hermitage here in Edward the Confessor's reign, says it was "in the wild forest;" and the hills and the country all around their bases for many miles were generally termed a wilderness, and are so called by William of Malmesbury. To what extent the Saxon monarchs claimed this tract of country does not clearly appear; but under William the Conqueror it was considered and held to be royal property, and so continued till it was granted by Edward I. to Gilbert de Clare, Earl of Gloucester, commonly called the Red Knight, on his marriage with Jean d'Acres, the king's daughter. According to legal technicality, no subject could own a forest, and therefore the name was altered to that of Chace. Leland, who wrote *temp.* Henry VIII., says—"The Chace of Malverne is bigger than either Wire or Feckingham, and occupieth a great part of Malverne Hills. Great Malverne and Little Malverne also is set in the Chace of Malverne. Malverne Chace (as I hear say) is in length in some places twenty miles; but Malverne Chace doeth not occupy all Malverne Hills." Other authors describe it as extending from the river Teme in the north to Cors Forest (now Corse Lawn) in the south, and from the river Severn on the east to the top of Malvern Hill westward. This last boundary was so indeterminate that the bishops of Hereford, who possessed lands at Mathon and Colwall, and who claimed the western side of the hills for their hunting-ground to the summit of the ridge, had a great dispute with the potent Red Earl, which it is said was only ended by a trench being dug along the

crest of the hill to divide the possessions of the disputants. This trench still remains very clearly marked, on the hills in several places, and is particularly evident on the Worcestershire Beacon.

There is some confusion in writers on the history of the Chace of Malvern as to the occasion on which this trench was made, though it was clearly meant as a boundary line. Chambers (copying, I presume, from Dr. Nash) states that the ditch was made to "divide the possessions of the Bishop of Hereford from the Chace, and to limit the two counties." This would obviously appear to be correct; but Dr. Thomas, whose version of the matter I have given further on, says that the trench had been made "to the damage of the Church of Worcester, and hence the controversy" on the subject between the Red Earl and Bishop Godfrey Giffard.

Dr. Thomas, I presume on documentary evidence, proceeds to give his account of the transaction as follows:—"On the eve of the Lady Day, 1289-90, there was a court held by the king at Feckenham, and inquiries made throughout the whole county who had transgressed in hunting in that forest, and many were imprisoned, and others that were indicted for the same found six sureties for their appearance before the king at Wodestoke on the nones of April, to hear his sentence of mercy or judgment, and because there was no other equity but the king's will, the bishop's (of Worcester) redemption was taxed at 500 marks, and the prior's at 200. About this time he (Godfrey Giffard) had a controversy with Gilbert de Clare, Earl of Gloucester, and Jean his wife," &c.

Malvern Chace had its peculiar laws and customs, even after it became the property of a subject, and "the foresters" had very considerable power within its limits, extending even to judicial functions. It is stated in documents given in the appendix to the Forests, in Nash's Worcestershire, that the foresters only had authority to arrest every felon for felony and murder "found within the said Chace," and they were to bring him before the chief forester, who held of the chief lord in fee by a certain rent of an axe and a horn; and he had power to sit in judgment on the said felonies and murders, as also to execute the office of coroner, and if the persons tried were found guilty by a verdict of twelve men thereupon charged and sworn, of the four next townships adjoining unto the place where the said felony and murder was done, his head was to be struck off with the forester's axe at a place called Sweet Oaks within the said Chace, where they always sat in judgment on such persons, and the body was to be carried unto the height of Malvern Hill unto a place called Baldeyate, and there to be hanged on a gallows, and so to remain, unless licence was granted by the chief forester to take it down. It does not appear that "the chief forester" was bound to be learned in

the law, and perhaps a poor fellow obnoxious to the chief or any other forester, if "found within the said Chace," might have had but scant justice allotted to him, and his head be placed in unpleasant proximity to the forester's axe.

The lord of the lordship of Hanley was the chief lord of this Chace, and of all the royalties of it, and appointed the constable of the Castle of Hanley, the parker of Blackmore, the steward, the bailiff, the master of the game, four foresters, and a ranger, to hold once in the year a lord day and a court baron; and every three weeks to determine all manner of pleas and trespasses, debts, or detainer, which exceeded not the value of forty shillings. To this court, besides the homage and customary tenants thereof, were "free suitors," the Abbot of Westminster, the Abbot of Pershore, the Prior of Much Malverne, the Prior of Little Malverne, the Lord Clifford for the lordship of Stoke-upon-Severn, the Lord of Madresfeyld, the Lord of Bromsberrow, and the Lord of Byrtes-Morton.

Attached to the Chace were also certain verderers, viewers, and riders, which by their tenure and holding of land had power to ride and perambulate the ground, soil, and townships of every lord, from Charmey's Pool upon the south unto Powyke Bridge and Braunceford Bridge, to oversee the highways and watercourses, and to take care that the wood hedges adjoining to the Chace be lawfully made for the preservation of the deer. The viewers and riders were also to look to "the hombling of the dogs," and to have the oversight and correction thereof twice every seven years, and such manner of dogs as were found unlawful, that is to say, as could not be drawn through a certain sterop of eighteen inches and a barleycorn in length and breadth compass, the farther joints of the two middle claws were to be cut clean away, and the master and owner of the dogs were to be amerced 3s. 1d.

The chief forester, who was generally a gentleman of position, had various fees assigned to him, as "crops of all the oaks," any excess of "the mast" in autumn beyond what was required for the commoners' pigs, the "windfall wood," the "3d penny of attachments made in the Chace," and the "3d penny of all felons' goods and forfeitures within the Chace." Every commoner might fall "what wood pleaseth him upon attachment,"—the attachment not to exceed the value of the wood, and "the forester may lawfully follow the commoner with his wain unto his own house and attach him there; if he may come to put his bow betwixt the foremost oxen and the gate-post of his house." The commoners and inhabitants in and about the Chace were to give notice to the foresters of any deer coming upon their premises, but they were on no account to kill, molest, or disturb them, under penalty of answering for the same at the Court of Hanley, with

"humble pie" in prospect. The commoners, however, were entitled to put their pigs into the Chace in autumn to feed upon the acorns from the oaks, and if it appeared that there was more mast than the commoners' hogs would consume, the public crier was to announce the fact in the neighbouring towns, and the surplus mast was to be sold for the benefit of the lord, a portion going, of course, to the chief forester.

All these particulars, laws, usages, and customs passed away when the Chace was disafforested in 1632, and there only remains what was reserved by a decree of Chancery, and the order in Council explaining it, made at Whitehall, 5th September, 1632, by which after confirming the grant by the king of his third part of the Chace to Sir Nicholas Vermuyden, it is declared that the other two parts shall be left open and free for the freeholders and tenants and commoners to take their common of pasture and common of estovers therein; with the restriction that no enclosure shall be made, or woods and trees felled within the two-third parts subject to right of common.

These reserved rights still remain where not altered by modern enclosure acts, and the rights of the commoners still appertain to all the waste within the extensive parish of Great Malvern. So that in the sale or grant of any waste land for public or private purposes, the commoners may demand compensation; and in a recent railway case when the Hereford Railway was made they obtained it, the money valuation of their abstracted rights being now deposited at exchequer interest in the Worcester Old Bank.

The deer of the Chace were probably all destroyed at its disafforestation, for nothing further is anywhere mentioned about them, and none appear to have been preserved in the paddocks of country gentlemen. If any stray ones remained, doubtless in the lawless time of "the great rebellion" they were finished up without remorse. Neither, as far as I know, has any account been left, in story or ballad, of the exploits of the Foresters, Verderers, and Free Suitors, in their forays and huntings after the deer, or the record left of any "Merrie men" who might have furtively sought after a fat buck; or any caitiff prowler who by "the verdict of twelve men" found his head placed under the Forester's axe, "in the said chace" at Sweet Oaks, "where they always sat in judgment on such persons."

The homage-tenants and commoners living on the borders of the Chace were not privileged to take or kill any of the deer there abiding, even if they trespassed upon their homesteads; but then they had the run of the open parts of the Chace for their live stock in the summer season, and other rights of "estover," loppings of wood, &c. I should hardly dare assert that a joint of venison did not occasionally get into some of the homage-tenants' houses, for deer stealing, as

Shakespeare's history shows, was then considered rather a jolly, if illicit, pastime; and the bow did not give such an alarm in its discharge as the gun. There were serious riots by the country people (countenanced too by several landed proprietors) when the Chace was first disafforested and partially enclosed, and this seems to imply a disorderly population resident thereabout, not particularly moral in their habits, and who disliked the impending changes, which would interfere with their unlicensed pilferings, and restrain their pursuits. Even late in the present century, the Commissioners of Woods and Forests gave orders for the destruction of all the deer in the Forest of Dean, from the temptation they presented to the labouring population to kill them whenever they could, and the immorality and crime that prevailed while they were preserved in the woods and coverts.

Nothing is stated with certainty as to the ownership of the Forest or Wilderness of Malvern before the reign of Edward I., who granted it as royal property to Gilbert de Clare, Earl of Gloucester, and it was henceforth called a Chace. The second Gilbert de Clare married Maude, daughter of John de Burgh, when the Chaces of Malvern and Cors, with the Castle and Manor of Hanley, were assigned her as a dower; but the earl being killed in the Scottish war, and having no children by Maude, these possessions went after his death to his sisters, as his heirs, and the eldest, who married Hugh le Despencer the younger, brought them with other possessions into the Despencer family, where they remained till in the third generation, then passing by marriage to Richard Beauchamp, Earl of Warwick, a renowned general in the reign of Henry V., who was killed in the French wars. His son, Henry Beauchamp, created Duke of Warwick by Henry VI., died aged only 22, at Hanley Castle, and was buried in Tewkesbury Abbey. His estates, and Malvern Chace amongst them, as he died without issue, passed to his only sister and heiress, Ann, married to the celebrated Richard Neville, Earl of Warwick and Salisbury, the "king-maker," who leaving two daughters, his large estates were, as heiresses, divided between them. One was matched to the unfortunate Edward, Prince of Wales, son of Henry VI. and Queen Margaret, murdered after the fight at Tewkesbury. She was married afterwards to King Richard III., but had no issue. The other became the wife of George, Duke of Clarence, who left one son. This son and heir was beheaded in the Tower, on pretence of conspiracy, by order of Henry VII., who then seized upon all young Warwick's possessions, including the Castle and Manor of Hanley, the parks of Blackmore, Hanley, and Cliffe, all lying in the bosom of the Chace, together with the market town of Upton-upon-Severn, and so these possessions, thus unjustly obtained by Henry, remained crown lands till about the year 1630, when King

Charles I., on certain conditions, granted one-third part of the Forest or Chace of Malvern to Sir Robert Heath, then Attorney-General, and Sir Cornelius Vermuyden. In the meantime many rights or claims of right had arisen by grant or long usages in the lapse of several centuries, and when the grantees began to enclose the Chace, the commoners and other persons interested disputed their right to do so, and several riots and disturbances took place in consequence. Nevertheless a decree was issued in 1632 for the "disafforestation of the Chace of Malvern, and for freeing the lands within the bounds, limits, and jurisdiction thereof, of and from the game of deer there, and the forest laws." By this decree (to obviate all disputes) one-third part only was to be severed and divided by commissioners, but the other two parts "shall remain and continue unto and amongst the commoners, and be held by them according to their several rights and interests, discharged and freed from his Majesty's game of deer there, and of and from the forest laws, and the liberties and franchises of Forest and Chace, in such sort as by the said decree it doth and may appear."

But besides the tenants and commoners, several powerful land-owners, with rights or claims upon the Chace, opposed the execution of this decree, and Sir Thomas Russell, John Hornihold, Esquire, and others, presented a bill in Chancery praying its reversal; while in the meantime, William Noye, Attorney-General, exhibited an information in the Court of Star Chamber against Sir Thomas Russell, Knight, Sir William Russell, Bart., and others, "for certain riots and other misdemeanours supposed to have been done in opposition and hindrance of the execution of the said decree."

To end the dispute an order in Council was made at Whitehall, 5th September, 1632, to explain the former decree, and for "the settlement of the differences" that had disturbed the country. By this it is declared that the third part to be enclosed should not be the best selected, but "indifferently taken, bad and good," and that "the other two parts shall be *left open and free* for the freeholders and tenants and commons, to take their common of pasture and common of Estovers therein;" with the restriction that *no enclosure shall be made*, or woods or trees felled within the two reserved third parts. This "order of explanation" was to be held as part of the said decree, and still remains in force (being afterwards confirmed by Act of Parliament 16th Charles II.) as to such waste lands in the parishes of the Chace that have not become subject to enclosure acts, or been allotted according to the claims made before the enclosure commissioners. But I believe only Castle-Morton, Great Malvern, Colwall, and Mathon are now left exempt from later acts and orders of enclosure, so it behoves the freeholders and commoners of Great Malvern

especially to see that they are *not despoiled of their rights, which are yearly lessening.*

It appears that John Hornihold, Esq., of Blackmore Park, had at that time, whether from ancient grant or otherwise is not stated, certain rights called "Rent Oats" and "Rent Hens," payable to him by some of the inhabitants of Malvern and Mathon; and so the decree, it is declared shall not be construed or taken to extend to debar the said John Hornihold, his heirs or assigns, for "or concerning his or their Rent Hens, heretofore to him due, or payable by and from any of the inhabitants of Much Malvern and Mathon, in the said county of Worcester, and of Colwall in the county of Hereford, but that the same Rent Oats and Rent Hens shall, and may be and continue yearly due and payable to him, the said John Hornihold, his heirs and assigns, as in his or their former right, and as if the said decree or disafforestation, or discharging the said Forest or Chace had never been." This decree, made in the eighth year of the reign of Charles I., was afterwards ratified and confirmed by Act of Parliament 16th Charles II., most of the King's third part being then by "mean conveyances" passed into the hands of Sir Nicholas Strode, of the Inner Temple, Knight; and what was in Herefordshire being then in the hands of John Birch and William Thackwell, gentlemen. The right of common here reserved was maintained by several trials of law, as appertaining to thirteen parishes within or bordering upon the ancient Chace; but encroachments and later enclosure acts, as well as the application of the late general enclosure act, has left the decree almost inoperative, except as to the waste within the parish of Great Malvern.

If we now turn to regard the size of Malvern Chace as at present enclosed and cultivated, we shall find but few extensive commons or wastes left within it, and fewer still vestiges of real forest ground. In the present state of the country, when enclosure has done almost all it can, with barren ground converted into green meadows and cultivated fields that now meet the view almost everywhere between the Hills and the Severn, it is scarcely possible to realize the Forest scenes of the British and Saxon times. Little, if any of the original "Forest" as understood by the term, now remains, for the few woods that have been suffered to exist, being merely allowed to form bushy underwood that is felled every seven years, or permitted to raise thin and lank hop-poles, give but a very inadequate idea of the sylvan aspect of olden times. Every year, too, diminishes these limited woodlands, which are lessened by grubbing up, and made arable, and it would be difficult at present to find many old forest veterans that existed when the Clares and Despencers, or later still, the Beauchamps and Nevilles, held their court at Hanley Castle.

But although individual trees of great size and age are of rare occurrence, yet some woodlands that have been such from the earliest times yet remain, and this is especially the case where yews and hollies grow, darkening the ground with sylvan gloom at all times. In the parish of Powick, about the Berrow, as well as in various parts of Colwall and Mathon, there are ancient woods sufficiently embowered in foliage to reveal the picture Lucan has drawn in Druidical times—

“Where in deep horror had for ages stood
A dark unviolated sacred wood;”

for notwithstanding the various enclosures of late years that have reduced the once extensive Chace of Malvern to a comparatively narrow compass except in name, secluded spots still exist environed with trees and bushes, almost as lonely, solitary, and deserted, as when through uninhabited wastes the chief Forester galloped about with his axe, the dread of prowling caitiffs, or yeoman pricklers moved merrily along to rouse the stag from his lair in the ferny hollow. About the eastern base of the Herefordshire Beacon, and on either side of the Ragged Stone and Casend Hills more to the south, are dingles leafy as “Merry Sherwood” ever beheld; the dense woods upon the Holly-bush Hill are as solemn as old hollies and sombre evergreen yew-trees can make them, while Castle Morton common still shows a wide green expanse, with here and there a pool, where the lovers of hunting may follow harriers and fox-hounds, if the chase of nobler animals than hares and foxes can now be no longer taken.

In the autumnal and winter seasons Longdon Marsh covered with water used to present the appearance of an extensive lake, and bordered by a dense growth of sea-rushes, tall carices, and an army of plumose reeds, had a wild and solitary aspect, a few clumps of silvery-leaved poplars (*Populus canescens*) giving a peculiar character to the aqueous scene. But the drainage of the marsh, recently taken in hand, will, if successful, change the aspect of things entirely.

In the parish of Colwall, near the old hunting seat of the Bishops of Hereford, is a good-sized fish-pool, though now almost half choked-up and closely environed with a dense growth of tall carices, which on the last occasion I saw it was crowded with a flock of sable coots (*Fulica atra*). These birds inhabit few pools in the Malvern district at present.

Near the last-mentioned pool, in the middle of a pasture, stand the COLWALL OAKS, the two oldest oak trees anywhere about the Malvern hills, and manifesting in their size of bole and bare stags' arms at the tops rising high in air undoubted evidences of very high antiquity. The largest has been much shattered and lost some of its finest branches, so that at a distance it has a lank and attenuated look,

but when closely examined the size of the old bole, now getting hollow within, appears very great. The extreme base of the trunk bulges out considerably, and is rather more than 60 ft. in circumference; but this diminishes so quickly that a yard from the ground the tree is only about 27 ft. round. It is worthy of notice that in the deep rifts of the bark of this ancient oak a lichen grows that I have nowhere else met with near Malvern, and that is the gray speckled *Opegrapha* (*O. lyncea*), which is well marked by the pruinous or bloomy apotheciæ, which seem pressed into the white mortary crust on which they are placed. The companion oak to the great one, and almost as old, is 45 ft. round its swollen base. These old veterans stand on ground that centuries ago formed part of a park belonging to the Bishops of Hereford, who had a country seat at Colwall, remains of which yet exist in a three-gabled timbered farmhouse near the church. Beside some of the windows of this old mansion are placed small pointed holes covered with a movable board, from whence it is commonly said by the Colwall people that the deer were shot at. I am not inclined to endorse this supposition, believing rather that these curious holes were for talking to persons without after nightfall, when it might not be safe to open the door. Considering the centuries that the oak continues to grow, and that the trees are in a decaying state, it may be confidently affirmed that they are 800 years old at least, and more probably 900—so that Virgil well said of so enduring a tree—

“ For length of ages lasts his happy reign,
And lives of mortal men contend in vain.”

Yet 900 years will not carry us back into Druidical times, and probably no tree now exists in the precincts of Malvern Chace that stood in its leafy amplitude at the invasion of Julius Cæsar.

Still some dark and dense woods remain forest ground now as in ages past, and I may mention the Berrow Wood, the extensive coverts that stretch about the western base of the Herefordshire Beacon, and the very thick wood on the eastern side of the Hollybush Hill, rendered still more gloomy by scattered though stunted yew trees that shadow the ground solemnly even at mid-day. Forest scenery may be well exemplified within the Hollybush Wood, which, belonging to Earl Somers and preserved as a covert for game, is seldom or ever felled or disturbed. Here old trunks, either upturned by the furious winter gale, or falling down by their decrepitude, lie rotting on the ground, and often get covered with a crop of velvety ear-like fungi, or round, hard balls black as charcoal, known to botanists as *Sphaeria*. On the large decaying polypori and other fungi smaller coloured species grow, while mosses and *jungermanniæ* clothe the damp boughs of the shadowed trees with a dense verdant covering.

The Hollybush Hill must have been noted for the evergreen hollies that cover its declivities from the time that the invading Saxons first approached its verdant crest, and thus it has continued, wild, beautiful, and almost untouched down to the present day. The holly is a very slow-growing tree, and some of those tall ones within the depths of the wood are of considerable bulk—several even decayed and partially hollow—and must be of very considerable age, extending to hundreds of years. Some of the older trees have on their smooth bark those curious *lirellæ*, as botanists call them, which very closely resemble Persian or Arabic characters, and might almost seem to be translatable. The species called *Graphis elegans* is most conspicuous, and when rather enthusiastic about lichens some years ago, the skins of the hollies here produced me some very capital inscriptions, though the scalps of the trees suffered temporarily. The hollies also produce the rare moss called *Daltonia heteromalla*. Several of the larger holly trees have three or four trunks in close juxtaposition, offering a pleasant shade in summer-time.

The holly must have been ever a great adornment to the thickets of Malvern Chace, and still is within many of the woods and copses near the hills, as in Brockhill Wood and about Cowleigh Park. The sides of that curious geological feature called "the Ridgway," at the western base of the Herefordshire Beacon, and leading towards Eastnor Castle, are still densely wooded, and though modern adornment has been introduced upon the scene, one natural feature remains in the pretty grey-green juniper (*Juniperus communis*), which being preserved here grows finer and taller than in any other part of the Malvern country. I have observed the juniper on the borders of woods about the Croft, Mathon, and at Bush Hill, Powick, and it must formerly have been more dispersed about the Chace, but at present it is almost eradicated. It is on the side of the Ridgway, not far from the second lodge, that an oak appears with a considerable quantity of mistletoe upon it, near the top of the tree. This oak is, however, a slender one, and not above 250 years old.

Among other localities that still retain traces of the green forest of olden days, High Grove and the Old Storage, stretching northward, may be mentioned, as well as Rough Hill Wood, and the bushy and diversified dingles of Cowleigh Park, till lately horrent with masses of entangled brambles, and marshy spots shadowed over with clumps of alders. Even Abingdon, the antiquary, marked Cowleigh as "a place where the springs descending from above with a soft murmur delight the senses. A seat for the Muses, but better for devotion; for lifted aloft, yf ye look one way ye see nothinge but the hills and heavens, if the other below ye, a most large prospect of this perishing world which passeth in a moment." Dripshill, the Berrow Hill, and

Sarnhill, the latter towards the southern end of the Chase, are also wooded eminences, with great quantities of the *Iris fetidissima* about them; and the grounds about Pull Court, the mansion of William Dowdeswell, Esq., emparked from a very early period, present a charming picture of sylvan scenery.

The idea of a forest, however, brings before the mind images of great clumps of tall trees standing in imposing grandeur, as well as majestic old forest veterans detached and standing separate here and there—

“Trees that have outliv'd the eagle;”

some venerable in decay with bare arms and riven trunks, patriarchs of the sylvan scene, rooted here and there like chieftains surrounded by their subject retainers. Of these it must be confessed that not any very great number can be adduced, but I will now proceed to enumerate some of the most curious relics of forest times that yet remain scattered in and about the confines of the Chase. Along the sides of brooks and ancient water-courses old trees and weather-beaten boles long remain to an uninterrupted old age, and so neglected pools may be found embowered with aged veteran patrician trees that for the sake of marking the spot and preserving the water have been suffered to remain till in their decrepitude, for though well deserving the notice of the lover of woodland scenery, they have become worthless as timber.

As forming a good picture of sylvan scenery, “The Grove” at Little Malvern may be referred to, on the eastern edge of which is a fine spreading oak known as “the Benedictine oak,” which, had it the faculty of Tennyson’s “talking oak,” could doubtless bear witness to the colloquies of monks from the adjacent Priory. Though this particular oak can only make pretension to have had Benedictine monks under its branches when Little Malvern Priory was intact, yet in those days there were older patrician trees existing going much farther back into “the times before them,” and of the Priory itself it might then have been justly said in the words of Byron—

“It stood embosom'd in a lonely valley,
Crown'd by high woodlands, where the Druid oak
Stood like Caractacus in act to rally
His host with broad arms 'gainst the thunder-stroke,
And from beneath his boughs were seen to sally
The dappled foresters.”

Within the grove, extending as it does to the very base of the Herefordshire Beacon, by degrees the external world is entirely shut out, and all is solitude and seclusion. Tall oaks and ashes rise high in air upon the slanting banks of the glen, but beneath their branches only a mazy thicket of brambles and close-growing eagle-brakes are discernible, or the rough surface of the Beacon closing the vista. A

narrow streamlet glides with a faint murmur, though unseen from the plants that environ it at the bottom of the slope, and here is loneliness that might again excite to eremetical abstinence or the solemnity of religious thought.

Though the Chace even now possesses a few "salvage woods of ancient growth," yet old trees of any size are mostly scattered about at wide intervals, and many have been "levelled," as Cottle says in his poem on Malvern, long ago. Here and there ancient battered oaks, shorn of their grand spreading arms, and hacked mercilessly from time to time, tell a tale of antiquity, for doubtless they have stood the brunt of many hundred winter storms, and with respect to some their age can only be guessed at, though probably reaching back at least into Plantagenet times, when Hanley Castle was entire, and a



OLD POLLARD OAK, IN A MEADOW NEAR THE SEVERN,
SOUTHERN PART OF MALVERN CHACE.

Despencer or a Beauchamp rode forth with his verderers to rouse the deer from their lair. Such oaks may be occasionally noticed in old hedgerows, like the one represented (see the cut above), which is 17 ft. in circumference at three feet from the ground.

This tree stands in a field near the Severn, and puts out horizontal arms in a very curious manner. It is a characteristic specimen of what is called a "burr oak," of which many may be seen, having been pollarded, and thus left to shoot forth new arms, and make a more dwarfish appearance than it would otherwise have done. When thus left in the condition of "burr oaks," the decaying branches sometimes assume curious and even demoniacal shapes. This is the case with an old and partly hollow oak that stands in a hedge by the side

of the road leading to Sherrard's Green, below Great Malvern, and bears the name of "The Devil's Oak," which the outline of several of its dying branches might well indicate for an appropriate name. It is said, however, that the appellation was really given to it from some sweeps having been seen to emerge in the mist of an autumnal morning from its cavity where they had been sheltering, and as they disappeared in the fog, looked very much like young devils! The name, at all events, is likely to stick to the deformed tree. Another curious old hollow oak, all but dead, stands with a shed placed against



THE "DEVIL'S OAK," NEAR SHERRARD'S GREEN,
MALVERN.

its serried bole by the roadside near the boundary of the parishes of Pendock and the Berrow, and is probably between seven and eight hundred years old.

Only one oak of any conspicuous size or spread of bough now remains standing near Great Malvern, and that is in the middle of the pasture next to Cowleigh Farmhouse, and so may be called the COWLEIGH OAK. This indeed does not as yet show the stag's horns—"reliques of its trophies old"—that denote extreme antiquity; but it is a tree of considerable size and breadth of head, and its trunk is about 24 ft. in circumference at a yard from the base. It may be

considered as more than six hundred years old. "Cowley's Oke" is referred to in a MS. Survey of Malvern Chace, A.D. 1633.

Some of the grand spreading oaks that adorn the beautiful grounds of Pull Court, Bushley, the residence of William Dowdeswell, Esq., may give a good idea of the aspect of Malvern Forest ere its best trees were felled, and some of these majestic veterans may claim an antiquity extending as far back as four or five centuries. A curious lone tall but hollow oak stands in a field by the side of the road between the Oxeye turnpike gate and the Long Green, on the road



GREAT BURR OAK, STANDING IN A FIELD ON THE BANKS
OF THE TEME, IN THE PARISH OF LEIGH.

from Tewkesbury to Pendock, which must have been a rural landmark for many generations. It is swollen about the base, with a considerable hollow within, able to shelter many wayfarers, and there is I have heard, some legend or story in connection with it.

The "White-leaved Oak" valley, between the Ragged-stone and Keysend Hills, keeps in its name the memory of an oak that existed there within memory, whose leaves being variegated with white blotches caused it to be considered a curiosity and prodigy. Such oaks with variegated leaves are very uncommon, but occur occasionally, and one with its leaves slightly mottled with white now

stands upon the sienitic boss in Cowleigh Park. Some superstition is generally attached to them.

Scattered over the country once included in Malvern Chace many dwarf "burr oaks" of considerable age may yet be found in old hedges, and by the side of lonely pools and streams, where they are with difficulty dislodged, and after lopping push forth a crowd of young branches on their distorted heads. A remarkable dwarf tree of this description exists on the banks of the Teme in the parish of Leigh, about a mile west of Bransford Bridge. This has a bole much swollen above the base, and is 20 ft. in girth at a yard from the



OLD HOLLOW YEW TREE IN CRADLEY CHURCHYARD.

ground. It is represented in the cut on the preceding page, well recalling Mason's description in "Caractacus"—

—"Behold yon oak,
How stern he frowns, and with his broad brown arms
Chills the pale plain beneath him."

The Yew (*Taxus baccata*) may be considered as a tree equal, if not superior in endurance to the oak, and in the woods that still remain, within the boundaries of the Chace, this long-enduring tree is plentiful, and certainly indigenous, especially upon the hilly ground of the Silurian strata. In one of these woods I have counted between

twenty and thirty yews, and in the winter season they are very conspicuous. Most of the churchyards in the Malvern district possess a yew, but except one in Stanton churchyard and two in Cradley churchyard, none are of very remarkable size or great age. The largest of the Cradley yews is rather more than 26 ft. in circumference at three feet from the base. The most picturesque of these is hollow, with a wide spread of branches, and is depicted in the opposite woodcut. In Stanford Bishop churchyard, just within Herefordshire, is a still larger female yew, that in 1852 measured 27 ft. in circumference



ANCIENT YEW TREE ON CONYGREE HILL, BROMSBERROW.

at four feet above its base, and higher up, where the trunk bulges out, 31 ft. There is a yew of great antiquity in Forthampton churchyard, all the upper part of which was blown down by a hurricane in 1839 though the base of the bole (then 26 ft. in girth) yet remains, with a living branch extending from it. I obtained a section of one of the branches, of the diameter of 9 in., within which were 227 rings of annual growth. If the growth of the bole was in proportion to that of the branch, this yew might be calculated as having existed more than 1,200 years. This would take us back to A.D. 670, and this

is by no means at all improbable. A very ancient and singular yew tree now stands on the truncated summit of the oval artificial mount at Bromsberrow, called Conygree Hill, and which looks like a huge dendroidal skeleton, with the baldness of its branches, almost devoid of verdure from being in a great degree shut out of light and air by a modern plantation that now surrounds the old tree, and robs it of the nutriment that its huge bole and numerous boughs demand. When measured in 1840 it was 25 ft. in girth, and as one of the oldest trees about the Malvern Hills, it is to be hoped that it may be carefully preserved by Osman Ricardo, Esq., on whose property it stands. The mount is supposed to have been a place of judicial assembly in ancient British times, and the yew may even then have existed. The woodcut on the previous page is taken from a sketch made on the spot some years since, but it remains in its seclusion in the same state. This yew must be certainly more than a thousand years old. A yew of considerable size, and showing the graves of "the rude forefathers of the hamlet" from Norman if not Saxon times, throws a mournful gloom upon the south side of Bromsberrow churchyard.

(*To be continued.*)

*THE SCOTTISH ARBORICULTURAL SOCIETY'S
PRIZE MEDAL.*

MY guidman got a medal hame,
An' hauds his prize wi' muckle glee;
Its legend set my thochts aflame:
'Tis "Aye be stickin' in a tree."
Stick in a tree, nae matter where,
On bare hill-side or tufted lea;
For when you walk the earth nae mair
Its boughs may green and verdant be.
Time was when a' oor mountain stood
Tree-clad from base to summit hie,
But aye men cut the growin' wood,
Nor thocht o' "stickin' in a tree."
An' noo the brown hill-tops look down
On miles o' woodless countrie,
Because some thochtless lordling's frown
Forbids them "stickin' in a tree."
Scotland, when shall thy glory cease,
An' a' thine ancient prestige flee?
When men forget in time of peace
To "Aye be stickin' in a tree."
Oh, dear old rugged mountain land,
An' nursing-place of Forestry,
Lang may thy sons, a stalwart band,
Tak pride in "stickin' in a tree."

K. KAY.

THE AGRICULTURAL DEPRESSION, AND HOW TO MEET IT: HINTS FOR LANDLORDS AND TENANT FARMERS.*(Continued from page 336.)*

"THE secret of cheap production is large production," says Mr. J. W. Barclay, M.P. for Forfarshire, and that what has been called high-pressure farming will be found to pay upon all but the very poorest soils there can be little doubt. But in order even to commence such a system many of the present holders of land would be obliged very materially to reduce their holdings to raise the capital necessary for the purchase of additional manures to secure the extra produce. Even then a succession of seasons such as we have lately experienced might cripple their resources before the flow set in. It is undoubtedly true that a judicious application of portable and easily applied manures would in the long run produce the desired results.

Mr. Barclay contends that the matter extracted from the soil by a yield of 28 bushels of wheat per acre, supposing the soil to supply the whole of the nitrogen, may be replaced by an outlay of 34s. per acre. If, therefore, by an expenditure of another 17s. per acre, 42 bushels can be ensured with the same cultivation and a small increase in the expense of harvesting, the gain is great in proportion to the outlay. Estimating 48s. per quarter as the cost in rent, tithes, labour, &c., for producing an acre of wheat, a crop of 28 bushels to the acre would cost £8 8s. But if the additional 17s. outlay will give us 42 bushels at a total cost of £9 5s. per acre, the wheat would then be grown at £1 15s. 2d. per quarter. Thus, though the larger crop has cost more money to produce, the actual cost per bushel or per quarter is considerably less than when the whole produce is low. And in this direction we must for the future look for profits rather than expect them from high prices. More money will be sunk in the soil, but the returns will in good years and average seasons be largely in excess of the additional outlay.

To secure the results indicated above there is no doubt that the farmer must more than ever be guided by the investigations of the chemist, and learn to apply those portable and economical manures which recent experiments have shown to be so efficacious and so sure in their action. We have not yet reached that stage of perfection when the farmer can carry in his pockets sufficient manure for his turnip crop; but owing to unpropitious seasons we have witnessed times when the produce of an acre of his cereal crops might be carried behind him in his spring cart to market, and the money which it realized would be barely sufficient to pay for the certificate which would entitle him to roam guu in hand over his stubbles.

One cause which has contributed very largely to the present depressed state of the farming interest is the almost entire dependence which the modern farmer has learnt to place in the middleman, and the consequent neglect of what ought to be looked upon as the main element in the education of the agriculturist, viz., a thorough acquaintance with the qualities of his produce, such as hops, corn, wool, &c., the weights of his fat beasts, sheep, and pigs, and the market values of his lean stock of all kinds. Whatever may be the causes of the general lack of this minute knowledge of those things which form the staple of his profession—whether a love of ease and of enjoyment in some instances, contempt for petty details in others, or the want of a proper training, which is but too common a defect—certain it is that it exists, and consequently the task of buying in stock and selling out produce is in the majority of cases entrusted to a third party, who is neither the producer nor the consumer. Whatever losses may fall upon the farmer, the middleman's commission is generally sure. To such an extent is the transaction of the farmer's business carried on through agencies of this kind, that in numerous cases which have come under my own observation sums equal to the maintenance in ease and comfort of respectable families have been paid away in commissions by the farmers.

As a class the middlemen are straightforward in their dealings, shrewd in business, and study the interests of their clients. The faults are not in the men, but in the system which has rendered the luxury necessary. If you encounter them at market they are gentlemanly both in dress and address, well up in the prices of produce, and able at once to place whatever you have to dispose of. At the market ordinary, or wherever farmers congregate, the middleman is generally found, often cheerful and entertaining at times when the low prices of wool, corn, beef, and mutton, the backwardness of the harvest, and the poverty of his crops cause great anxiety to the thoughtful producer.

In farming the grand economical principle of direct communication between the producer and the consumer is but seldom evolved, and the result often is diminished profits in good seasons and increased losses in bad ones. When we take into consideration the extent of the market transactions arising from the produce of a large farm of eight hundred or one thousand acres of good land—the meat, corn, dairy produce, fruit, &c., sold off, and the lean stock, feeding stuffs, and manures brought on—we can form some idea of the total amount paid away as commissions upon hop sales at 5s. per cwt. and upwards, cattle at 5s. per head, and smaller stock at proportionate prices.

It may be argued that the superior knowledge of the salesman, arising from a wider experience, enables him to obtain better prices

for the articles he offers, and that consequently the employment of such a man is in the end a gain to the farmer. But the necessity for the employment of a middleman is in itself a proof that the farmer himself is wanting in a knowledge of the fundamental principles of his profession; and in these evil days of farming the margin of profit is so small that it will not admit of subdivision.

Whilst admitting that the mere book-farmer, who lacks experience in the field, in the stockyard, in the market, and in the laboratory, must at the best only grope in the twilight of uncertainty, it must on the other hand be acknowledged that to an indifference to the knowledge to be obtained from scientific works on agriculture and from the journals devoted to the science may be attributed much of the backwardness to adopt improved machinery and to run out of the old grooves of husbandry. The ability to conduct a few simple experiments, such as will enable him to test the properties of the soil he cultivates, the constituents of the food and the manure he purchases, places the farmer in a much better position to cope with the manufacturer and the agent, who will otherwise foist upon him spurious articles which sometimes are not even worth the cost of carriage. The farmer who is either wholly ignorant of these things, or despises the minutiae of cattle feeding, cropping, and manuring, has his education to receive, or else he has mistaken his calling.

On all sides it is admitted that the main cause of the continued loss to the farmer has been excessive rainfall, the absence of sun, and the small quantity and inferior quality of his corn crops. To this must be added the low price of wool and the losses among live stock. When we consider that, according to Mr. Caird, during the last ten years we have had only two really good corn crops, and that nearly £120,000,000 of farming capital has been swept away by disastrous seasons, we shall cease to wonder at the outcry which has been raised throughout the country; and this has come upon us at a time when the pressure from local taxation has been falling heavily. The farmer complains, and in many instances not without reason, that he is unfairly taxed for educational rates, road rates, and in many other ways. Certain it is that the labourer's children, as soon as they have obtained a little of that knowledge which "puffeth up," turn their backs upon the country and upon farming avocations, and migrate to the cities and towns.

One fatal mistake which has been made in many districts, and by which local burdens have been considerably increased, is the handing over of highways to the management of boards of guardians, few of the members of which have any sound knowledge of roadmaking. One result of this step is the employment of incompetent surveyors. Good roadmaking in these days of traction engines and increased

traffic is of the greatest possible importance to the ratepayer. In not a few cases coming within our knowledge, the good work done in former years upon the roads has thus been completely upset, and the gravest apprehensions are entertained as to the ultimate cost of restoring those roads to their former state of efficiency. The continual meddling with his work is a fertile cause of embarrassment to the competent surveyor, while the multiplicity and diversity of opinions expressed is equally bewildering to the man who is receiving an education of the most expensive kind out of the pockets of the ratepayers. A few years' trial of the present system will seal its condemnation; but the experiment will prove a costly one.

The decrease of traction upon a well-formed and well-kept road is so great that a horse will draw nearly double the load that he can take along an ill-made and neglected one. This in itself is a sufficient inducement to keep our roads in a good state of repair. But the results are still more forcibly shown in the diminished cost of maintenance and the saving in horseflesh and in the wear and tear of vehicles and harness. An experienced roadmaker too will maintain a road in a state of efficiency with one-half the materials which would be employed by an ignorant and unskilful labourer. By a timely attention to the surface of the road, the laying on of materials wherever water lodges, regular scrapings and clearings of water-tables and back ditches, a firm and compact surface may be maintained. The indiscriminate throwing on of loose materials, former scrapings, and even turf pared from the edges of the roads, with the idea of making the whole mass bind together, instead of keeping out everything which encourages the retention of moisture and the action of frosts, and coating the whole surface with the finest stone, is a mistake of the first magnitude. If the materials are properly broken, and laid on as early as November or the beginning of December, they will bind readily, and where stone has to be added late in the spring, the surface of the old road should be picked up, so as to favour a complete amalgamation with the new materials.

Much of the expense of our by-roads is incurred through their narrowness, and the too great convexity of their surface. In consequence of this, vehicles must all follow in one track, the tendency of the wheels being to strike off towards the sides, and thus by a constant grinding action to wear away the materials of the road.

Either through jealousy of their powers, or from a conceit of superior knowledge, the services of competent surveyors have in too many instances been despised. The result is shown in the appointment of inferior men with no technical knowledge. The general supervision of one superior surveyor, such as is employed in South Wales, and in other parts of the country, would be a great saving to the ratepayer.

Taking these South Wales roads as an example of what may be attained by the employment of skilled supervision, it may be stated that the expense of general superintendence, auditing of accounts, preparation of estimates, and annual inspection, for the whole of the six counties has been only twenty-five shillings per mile.

Reference has already been made in these papers to rents and the means by which in many cases they have been raised through the keen competition for farms which was the rule until within the last few years. The late unfavourable seasons have in many instances brought about a considerable readjustment in the case of yearly tenancies, and a continuance of bad harvests would ultimately tell in the same way upon the renewal of leases. But it should be borne in mind that low rents alone, however much they may immediately benefit the suffering farmer, will not prove the universal panacea for the ills of the agricultural classes, which the framers of an Irish Land Bill would have us suppose. Inasmuch as they afford an opportunity for the impoverished farmer to recover lost ground, they must be hailed as a boon; but in numerous cases they prove a direct encouragement to bad and slovenly farming, thereby lessening the produce of the land, sending capital out of the country for the purchase of food and in the end beggaring both the owner of the land and the occupier. In several instances where land has been for years very low-rented and badly farmed, a wholesome rise of rent has given the tenant a stimulus to exertion, and thereby benefited both parties, owner and occupier.

The advocates of a comprehensive Tenant Right Bill should not lose sight of the fact that for every tenant who is valued out of a farm there is another to be valued in, unless the land is to remain untilled. Not unfrequently it is the large amount of money to be paid down upon entering on a farm which fetters the future action of the tenant, and leaves him but a small margin for further improvements. The words of the Duke of Argyll, as applicable to this subject, are well worth the attention of our legislators:—
 "It is hardly too much to say that the least intelligent agreement voluntarily made will be better than the wisest which could be embodied in an Act of Parliament. It would at least be flexible, open to adaptation and amendment, according to the growing intelligence of those whose interests are concerned. And there is another reason, even more important, for preferring the very slowest teaching of experience in such matters to the rigidity of legal obligations. It has been shown how the benefit of these legal obligations will always be discounted in the form of rent, or in the form of price charged for privilege; and how, consequently, they never can really benefit the pursuit and profession of agriculture. Whereas, on the contrary,

precisely the opposite result belongs to those amenities of dealing which arise naturally between men whose relations are founded on agreement. These are the only benefits which can never be discounted. They belong not merely to the occupants of the moment, but to all the occupants who succeed them. They belong to the position—they follow the relations—a relation which, though it be fundamentally and legally a relation of business, is, and ought to be, also a relation of personal good feeling and regard. It cannot be otherwise as long as it is free, because the connection is one which if not permanent or hereditary, must at least be habitual and of comparatively long endurance—a connection between men who have a common interest, and may well have a common pride in the oldest and the happiest of human industries.”

B.

(To be continued.)

PLANTING RAILWAY EMBANKMENTS.

SOME objections or restrictions which apply to the rearing of timber on railway embankments, briefly indicated, are—

1. The risk of windfall.
2. The risk of fire.
3. Lodgment of fallen leaves against the rails.
4. Hindrance of view over the adjacent country.

1. All trees of a large timber size are exposed to the danger of being overthrown by the strong winds of winter, blowing generally from a westerly direction. Those certainly which have grown up from their earliest youth in constant exposure to the wind become in a measure windproof; but no development of the roots, and no feasible precaution, will ensure perfect stability against severe storms. Sometimes, even though the roots remain firm, the force of the wind will tear off large branches, or even snap the trunk in two. A tree growing on the outward slope of a railway embankment, which had attained the moderate height of only 50 ft., would always, or nearly always, considerably overtop the level of the metals, and, if rooted in the upper part of the embankment, would reach higher than the telegraph wires. The unregulated fall of such trees might do damage, and interrupt the traffic or communication. Large trees on the bank of a railway cutting would in a still higher degree menace the traffic and the telegraph wires. In general trees fifty or more feet in height, especially on the west side of a line running towards north and south, either in a cutting or on an embankment, would add to the danger of travelling on a dark night in a high wind. These considerations would limit the age of trees on railway

embankments, and would be prohibitory to the production of strong timber. The trees would often have to be cut down in their thirtieth or fortieth year as a measure of precaution, and it would probably be convenient to treat them as coppice with a cycle of from fifteen to thirty years. Fruit trees too might be cultivated, even to an advanced age, without their attaining any dangerous height or bulk.

2. The risk of fire kindled by sparks from the locomotive is peculiarly attached to pines and other coniferous trees in dry weather, and especially in hot summers. Broad-leaved trees, when bare of their leaves in winter, are not entirely exempt from the same danger; but in their case the danger is not nearly so great. In North Germany such fires have occurred so frequently among pines (*Pinus sylvestris*—Scots fir) that it is now an ordinary precaution where a railway skirts or intersects a pine forest to interpose a belting or narrow strip of birch or some other leaf tree. This birch safeguard, being in leaf and green, will not burn in the summer-time, and serves to intercept the sparks which otherwise would have ignited the resinous and highly inflammable pines. The same precaution has to be observed, even along the more frequented highways in pine forests, against the incautious disposal of burning tobacco or matches. In England the danger would perhaps not be so great nor so regularly recurrent; but at intervals of several years there comes occasionally a summer of scorching heat and long-continued drought. Such a season would endanger the pines and firs which might have been reared on the railway embankment.

3. The third objection indicated has already been referred to in these columns.

4. The fourth objection hardly needs amplification, but seeks to give prominence to the desire of tourists, farmers, foresters, sportsmen, and most travellers to see the country through which they are passing.

S.

THE HOLLY.

THE holly is a general favourite, and it is found more or less in all ornamental grounds and policies. When planted out singly it has a very striking effect; it also forms a close ornamental hedge, and is used very extensively as underwood. There is a great variety of hollies—golden, silver, smooth, prickly, &c. There is one variety (*Ilex Paraguayensis*), a native of South America, the leaves of which are dried and roasted, and used as tea by the natives: so great is the demand for it that nearly eight million pounds are consumed annually. The common holly (*Ilex aquifolium*) is raised from seed, which ripens during the winter months. Some trees ripen earlier than others, according to

situation and exposure. Great patience is needed in the management of the holly berries; they must lie a year amongst sand, in which they must be well bedded, to prevent them heating: care must also be taken to protect them from the ravages of mice. After lying a year in the heap, they should be sown in beds about three and a half feet broad, amongst free, light soil if possible; when the seed is sown it should be clapped down level with the back of the spade, and a thin covering of fine pulverized soil spread on the top.

It sometimes happens that but few plants come up the first year; when this is the case the bed must just be kept clean until the following spring, when a second and fuller braird will appear. It may happen, however, that the seed may be inferior and never germinate at all; but it is a safe rule not to be in a hurry to dig over the seed-bed. The holly thrives best on a light, dry soil, for there is no plant that succumbs more quickly to the effects of wet than the holly. There is a fine holly hedge on the Dalkeith Park Estate, and on several occasions parts of it have turned brown and sickly. On examining the roots I invariably find that they have come in contact with stagnant water, or stiff, impenetrable soil; when this is remedied the plants in a year or two get strong and healthy. There are also thousands of hollies growing all over the estate as underwood, and the best plants are found on a light, loamy soil, resting on a bed of gravel. The plants on the outside of the plantations with an open exposure form an impenetrable thicket, as many of the under branches take root, and send out a mass of vigorous growth; this forms excellent cover for all kinds of game, pheasants especially, as they roost amongst the branches at night. In order to make good cover, therefore, hollies must have room; if they are crowded together you only produce bare poles.

Where the soil is suitable, 30 feet apart will be found to be a good average distance for planting holly as underwood. Sometimes hollies get drawn up when growing immediately under forest trees with dense foliage; when this occurs the tops should be cut off, which has the effect of thickening the under-growth.

I do not wonder that the holly has become a universal favourite; its shining foliage studded with red berries gives to the woods quite a gay appearance, even in the dead of winter. Throughout the festive season also the holly figures largely in all kinds of decorations, the other evergreens appearing very tame without it. But, although it is one of the best evergreens, I am sorry to say it is also one of the most attractive to vermin, for unless it is protected it is literally at the mercy of hares and rabbits. Unlike other trees, it does not protect itself by forming rough or corrugated bark at its base; hence a plant forty years old is just as liable to be destroyed as one newly out of the

nursery. It is quite a common thing to find during a heavy snow-storm trees a foot in diameter peeled round and round beyond recovery. I do not know of anything more disheartening than to have a lot of hollies, which have cost no little trouble in the rearing, killed off in this way. There is no use in blinking the fact that, unless hares and rabbits are kept down within a certain limit, it is needless to attempt to grow hollies. I include hares, for they are just as bad as rabbits. I do not suppose that these animals will ever be exterminated, and so long as even a few of them are roaming about, so long will hollies be exposed to damage from their attacks.

I read with great interest an article by Mr. McCorquodale, in the *Journal* for August, on the subject of how to protect trees from rabbits. I would feel obliged if he would let us know if he has tried the experiment of rubbing the tar on the trees in its cold state, by means of a rag, because up to this time I have found it necessary to give it a gentle heat, so as to spread it equally over the surface, and also to make the coating as thin as possible ; and instead of a rag, we use a brush. I confess that I do not see any analogy whatever between a tree and the human body as illustrating the point in hand. If it is true that our skins are more tender and porous than the bark of trees, and our food and assimilating organs the opposite of theirs, then those are the very reasons why they should be treated differently, and ought not to be compared with each other.

We have used coal tar for many years to protect our hollies. If the stems are above three inches in diameter, it does not seem to do them any injury, but anything under that has to be treated very cautiously. There is no doubt at all that tar has an injurious effect on the tender bark of young hollies, as I have seen them frequently die from its effects ; in such cases it was a choice of the lesser of two evils.

During the months of July and August I have been trying a new experiment in the way of protecting hollies. While engaged in thinning oaks, we had occasion to cut down about fifty Spanish chestnuts. We got those trees carefully peeled, and cut the bark into 18 in. lengths. After arranging the different sizes, two men were told off to put a length of bark round each holly stem ; as a rule very little fitting was needed, the only fastening required being a piece of rope yarn to keep the bark together. We have operated upon 200 hollies in this way, all good specimens, but which had all been nibbled at more or less during last winter. In going through them lately I find that the bark has shrunk tightly round the holly stems, and the rope yarn hanging quite loose ; I intend to let it remain, however, as the bark may slacken if wet weather sets in.

Now, some of these hollies have their branches nearly touching

the ground, and it is next to impossible to detect the chestnut bark, as its colour is almost identical to the holly, and, where it is seen, it is certainly preferable to the black coating of tar. Where the trees are large, we found that the appearance of the bark was improved by vandyking its upper edge. As this experiment is new, I cannot say much about it yet, but these guards have this recommendation, that they are cheap, are easily applied, and at the least will stand for six or seven years.

ROBERT BAXTER.

TREE PRUNING.

*Translated from the French of A. des Cars, by Charles S. Sargent,
Professor of Arboriculture in Harvard College, U.S.*

(Continued from page 406.)

AIM AND METHOD OF PRUNING.—The object of pruning, economically considered, is to make it possible to raise on a given surface, say on one hundred acres of sprout land, the greatest number of full-grown trees, and to make them attain the greatest value in the shortest time without injury to the young trees beneath them. This may be accomplished by increasing the vigour of the reserve trees and by lengthening, without diminishing in diameter, their trunks. Treated in this manner the reserve trees do not interfere with the circulation of air and light necessary to the development of the undergrowth; and many serious accidents caused to trees by wind, frost, and snow breaking the larger branches may be avoided by keeping their heads symmetrical and upright.

The perfect forest tree has a straight, single trunk, without protuberances or wounds, and carrying up the same diameter to the first branches, which should be placed at a distance from the ground equal to one-third or one-half of the total height of the tree. The head should be rounded, regular, and set upright on the trunk. The wood, owing to the healthy growth of the tree, is straight-grained, compact, and suitable for construction. Such trees have a high value; and, in order to grow them, a method of pruning is adopted similar to that practised by gardeners in forming pyramidal fruit trees, with the difference, however, that the gardener favours the development of the lower branches, which are necessary for his purpose, while the aim of the forester is to increase foliage at the top of the tree by diminishing the vigour of the lower branches; and to obtain by successive suppressions of branches the necessary length of trunk.

There are two distinct operations in pruning: the removal of some branches, the shortening of others. The shape of a tree must depend

somewhat, of course, upon its age, the nature of its surroundings, and the character of the soil, &c. Where pruning is not practised the reserve trees approach the proper form in proportion to the length of time the coppice beneath them is allowed to grow. In forests, where thirty or more years are allowed to elapse between the cuttings, the undergrowth serves to prune the permanent trees by checking the development of their lower branches, and thus determining the height of their trunks. Sprout land is, however, often cut over every ten years; and this practice prevents the production of fine trees by permitting the growth of their lower branches. These, of course, interfere with the growth of the reserve trees themselves as well as with the young trees between them. Judicious pruning can obviate this difficulty.

Classification of Forest Trees according to Age.—The technical names by which reserve trees are known vary in different regions. For our purpose it will be best to divide the life of a forest tree into four principal periods, designated as follows:—

1. Young, up to about forty years.
2. Middle-aged, from forty to eighty years.
3. Old, from eighty to one hundred and fifty years.
4. Very old trees, whose number is rapidly diminishing, may be called veterans.*

These divisions are not, of course, absolute, as it is often difficult to determine, even approximately, the age of a standing tree; and the forester must use considerable judgment in the application of the following rules:—

1. The head of the young tree should be egg-shaped or elongated oval (Fig. 12), and well balanced on the trunk, which should not exceed a third of the entire height of the tree. The lower branches should be sufficiently shortened to check their excessive growth at the expense of the leader, without, however, being so reduced as to impair the vigour of growth of the tree.

2. The head of the middle-aged tree should form an oval less elongated than that necessary for trees of the first class. The height of the trunk should equal one-third to two-fifths of the height of the tree (Fig. 13).

3. The head of the old tree (Fig. 14) should be gradually rounded in outline; the trunk may, in some cases, be made to reach a height

*The technical terms employed in France to designate trees of the four classes into which forest trees are generally divided, *Baliveau*, *Moderne*, *Ancien*, and *Vieilles écorces*, have no equivalent as yet, and are not well translated into English. The term "*Baliveau*" is also sometimes applied to reserve trees of any age left after the first cutting off of a plantation, and such trees are then called "*Moderne*," or "*Ancien*," according as they have been allowed to remain after a second or third cutting of the coppice.—C. S. S.

equal to half the height of the tree, which has now probably ceased to grow upwards.



Fig. 12.—Correct form of head for a tree under forty years old.

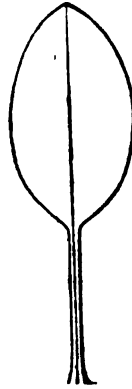


Fig. 13.—Correct form of head for a tree forty to eighty years old.

4. Veterans (*Fig. 15*). Trees classed as veterans have generally ceased to increase in size. They gradually become flat-headed, and spread out, without, however, greatly injuring the adjoining coppices and plantations destined to take their places.

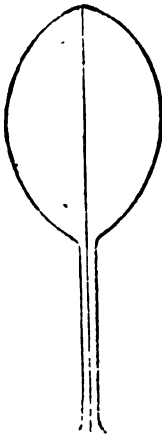


Fig. 14.—Correct form of head for a tree eighty to one hundred and fifty years old.

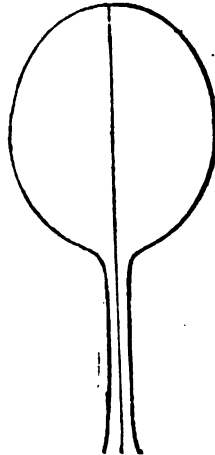


Fig. 15.—Correct form of head for a very old tree.

The proper method of pruning trees in each of these four divisions will be considered hereafter.

It is well to remember that the forms recommended are those nature gives the most perfect and most beautiful trees; although it

is the economic and not the picturesque aspect of trees which is here under consideration.

Tools used in Pruning.—The most convenient tool for pruning is a straight-bladed cleaving knife. Success in all operations of pruning depends on the neatness of the cut, and this cannot be attained with the common billhook used in many parts of France. The best tool for the purpose is (Fig. 16) one which has been used for many years in Holland, and which has lately been improved by de Courval. It weighs from 2 lbs. 12 oz. to 3 lbs. 6 oz., or more, according to the strength of the workman. The blade is reinforced in the middle to increase its strength and concentrate the weight. In the north of France



Fig. 16.—this tool is generally hung to an iron hook (Fig. 17) attached to a leather strap buckled round the workman's waist, who is thus left perfectly free in his movements (Fig. 18).
Improved pruning knife, Entire length, 16 in.



Fig. 17.—Iron hook used in attaching the pruning knife to the belt.

In pruning tall trees, or trees otherwise difficult to climb, the leather belt may with advantage be passed over the shoulder, thus bringing the pruning knife under the arm in a position from which it cannot easily be dislodged in climbing (Fig. 19). To ensure greater safety in climbing tall trees, a stout cord attached to the workman's waist may be fastened round the trunk in such a manner as to prevent, in case of accident, a dangerous fall. A hatchet is useful, and facilitates the operation of

pruning; it may be used with one or both hands, and serves to lop off large branches, protuberances on the trunk, or the dead



Fig. 18 —Pruning knife carried at the waist.



Fig. 19 —Pruning knife carried under the arm.

stumps of branches, which from their hardness would soon dull the edge of the best pruning knife. A saw, too, is very useful in

cutting large branches, but it requires so much practice to use this tool skilfully that it cannot be generally recommended.

Ladders.—Each labourer should be equipped with a light ladder, proportionate to the height of the tree on which he is to operate, and broader at the base than at the top. De Courval recommends that the feet of ladders intended for this purpose should be pointed to prevent them from slipping. This is a good plan, although hardly sufficient to prevent accident, and the top of the ladder should be fastened with a strong rope to the trunk of the tree to prevent it from being thrown down by falling branches (Fig. 20).

Hooks or Spurs.—Except in very exceptional cases, or where very large trees are to be operated on, the climbing spurs sometimes used by professional pruners should not be allowed. These men, paid according to the number of trees operated on or the quantity of wood cut, have no idea in pruning beyond cutting the largest amount of wood in the shortest time. Climbing spurs should never be used by good workmen even, in pruning young trees, whose bark is not sufficiently thick to resist the wounds caused by the sharp iron teeth of this tool. Wounds made in this way encourage the growth of injurious side shoots on the trunk, and leave defects in the wood which never disappear, and diminish its value.

Fig. 20.— Ladder fastened with a rope and carrying on the top round the pail of coal tar.



The future value of a tree depends upon the manner in which the operation of pruning has been performed; and the persons to whom this work is entrusted should fully understand its importance. Unskilful or injudicious pruning may completely ruin a tree, and the difficulty of obtaining labour capable of doing such work intelligently causes, no doubt, many arboriculturists to completely neglect pruning of every kind.

The Dendroscope.—The tree requiring pruning should be carefully studied from the ground, that the operator may be able to judge intelligently which branches should be removed or shortened in order to reduce it to the desired shape. This may at first seem difficult to beginners in the art of pruning; and a dendroscope, the name suggested for a simple little contrivance, the use of which is shown at Fig. 21, may be here used with advantage. A dendroscope may be made from a piece of thin board or cardboard (a playing-card answers the purpose), in which a hole of the shape it is desired to reduce the tree to has been cut (see Figs. 12, 13, 14, 15). Across the middle of

the hole, from top to bottom, a piece of fine wire is stretched to serve as a guide to the eye.

Holding the dendroscope at the level of the eye, with the wire opposite the centre of the trunk of the tree to be studied, the operator

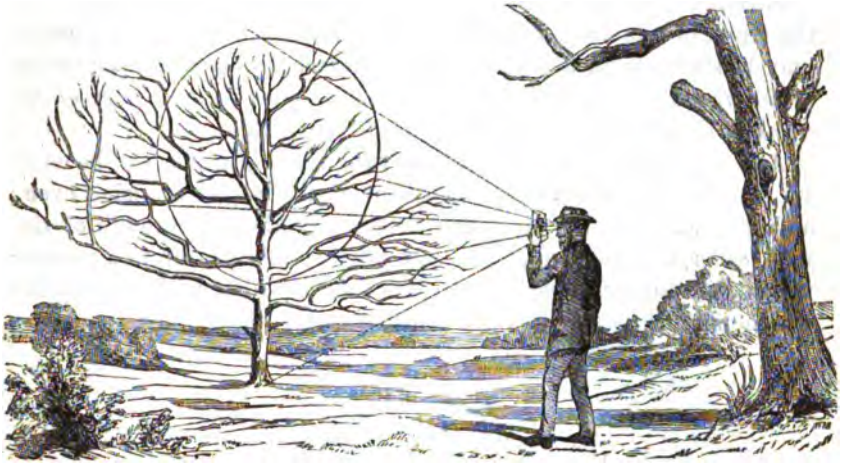


Fig. 21.—Manner of using the dendroscope.

approaches the tree until the bottom of the cut falls on the trunk at the ground line. It is easy to see at a glance with the aid of this



Fig. 22.—Oak sixty years old. Formation of a leader from a vertical branch.

contrivance what operations should be performed in order to reduce the tree to the desired shape.

Remembering that under ordinary circumstances a vigorous, handsome tree must have a straight, vertical trunk and an evenly-balanced

head, the first object of pruning should be to produce these conditions. The head, as has already been explained, should be oval in form; the height of this, however, must depend on the size of the trunk and the age of the tree when first subjected to the operations of pruning.

Selection of the Leader.—The branch most nearly perpendicular on the trunk of the tree should be selected to form the leader; and it may be stated as an absolute rule that *whenever a branch near the top of the tree stands vertically on the trunk, or even on any part of the trunk, it should be preserved for the leader* (Fig. 22).

And it is wrong to suppose that only the original leader can be used. Its place may be often supplied by one of the lateral branches even; and by shortening the other branches to stimulate the growth of the new leader, the tree will, in a few years, straighten up in a manner which will appear astonishing to persons unfamiliar with the results which may be obtained from a sensible system of pruning.



Fig. 23.—Oak with irregular head formed with several large branches.

If none of the branches near the top of the tree naturally approach a vertical position, two or three or several branches should be preserved to form a compact head, as represented in Fig. 23. If the tree so treated is young, it is desirable, if possible, to establish the fork at a distance from the ground equal to at least one-third of the height which the tree may be expected to attain at maturity.

Shortening Main Branches.—Starting from the top of the tree, where the operation of pruning should always begin, the leader is first formed with the branch selected for this purpose; the head is made with a single leader: or, in case of necessity (Fig. 23) with several leaders. The principal branches, if too long, should then be shortened, especially those inclined to assume a vertical position or to grow with too great vigour at the expense of the leader; such branches are called

gourmands. It will be seen that the right point at which to shorten these vertical branches is the point where they begin to assume an upright growth (A and B, Fig. 24).

In shortening branches, the cut should, if possible, be made above the point of development of one or several secondary ascending branches; these in turn should also be cut just above one of their secondary branches. In this way the direction of the main branch

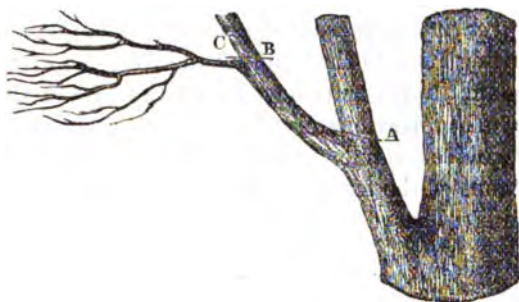


Fig. 24.—Double shortening of a main branch. A. Gourmand branch. B. Secondary branch. C. Small branch retained to ensure proper flow of sap.

may be entirely changed (Fig. 24), and its disproportionate vigour checked to the benefit of the leader and the whole tree.

Sap Lifters.—The name sap lifter (*Branche d'appel*) may, for want of a better term, be given to the branch or branches retained at the end

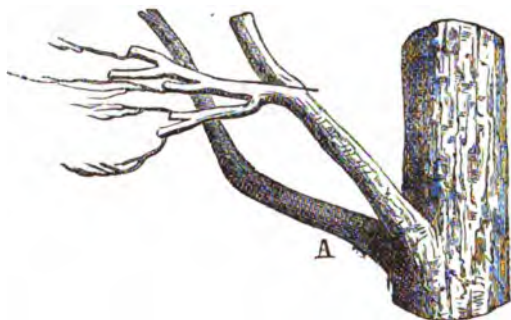


Fig. 25.—Removal of a portion of a forking branch. A. Preservation of a horizontal fork at the end of a shortened branch.

of the shortened main branch. The name indicates the object for which such branches are left; namely, to attract and elaborate, by means of their leaves, a sufficient flow of sap to ensure the growth of the branch. Sometimes the main branches are so long that it is impossible for the operator to reach the ends where the sap-lifting branchlets should, of course, be left. In the case of the oak, such branches,

except for the appearance of the tree, are of little importance; and provided the main branch retained is of a certain length (ten or twelve feet), and if it is large and on a large healthy tree, a sufficient number of new shoots to ensure vigorous growth will soon appear. With the beech, however, and some other trees which do not develop shoots from dormant buds as freely as the oak, it is necessary to cut the branch just above the forking of another branch or branchlet large enough to attract sufficient sap to ensure a healthy growth.

Double or Forking Branches.—In the case of a double branch, or of a branch forking close to the trunk of the tree, one of these branches (Fig. 25) should always be removed, that the base of the branch may not become disproportionately large. If, however, such double branches are objectionable near the trunk of the tree, they are of great importance at the extremities of main branches; and whenever it is possible branches should be shortened in such a manner as to

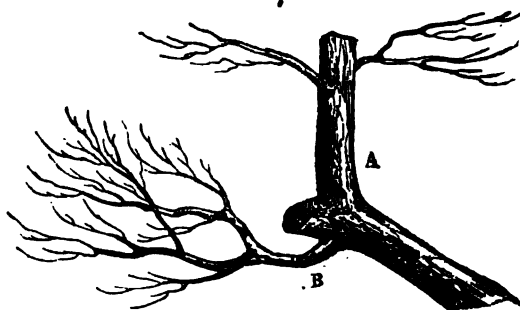


Fig. 26.—Effect of preserving a vertical secondary branch on the upper side of a shortened main branch. A. Branch thus retained, excessively developed at the expense of the rest of the tree. B. Sap lifter of the right size left on the lower side of the main branch to ensure its development.

secure forking branchlets at their ends. These give to the tree a more natural appearance, and by dividing the flow of sap prevent the growth of too vigorous shoots, which might in time develop into supplementary leaders, to the injury of the tree. For this reason it is necessary to remove all branches or branchlets assuming a vertical growth or inserted on the upper side of a shortened branch, in order to check the tendency of such branches to grow too vigorously at the expense of the leader (Fig. 26).

Although essential in pruning young trees, this is less important in the case of older trees with large full heads, which in themselves have a tendency to check an unnaturally strong growth of any individual branch; and in operating on old trees the preservation of

vigour in the shortened branch is the principal object to be attained. It is almost unnecessary to add that only main branches directed towards the outside of the tree should be preserved, and that branches which from any cause have turned back towards the trunk should be headed in, as well as branches with too great a tendency to droop unnaturally; generally, it will only be necessary to shorten such branches to induce them to reassume a natural direction of growth.

When several branches have been developed from one node, forming what botanists call a whorl, they should not all be cut away at the same time, lest the circulation of sap be checked by the destruction of bark (and consequently of cambium layer) over too large a surface.



Fig. 27.—Pruning badly commenced.

All dead and dying wood should be removed by the workmen in descending the tree; lichens, and other parasites which interfere with the growth of young trees, should be knocked off with the back of the pruning knife; and the mistletoe, the most destructive of all parasites to tree life, should be carefully removed by cutting off the branch bearing it.

The necessity of commencing the operation of pruning at the top of the tree must be insisted on; in no other way can the form proper to the tree be established or the safety of the operator preserved. The disregard of this rule was followed not long ago by what might have been a severe accident. An excellent workman was about finishing the pruning of a beech tree; two long, slender branches (A and B, *Fig. 27*) remained to be operated on. He cut the lower of the two

branches first; the twigs on the ends of the branches had become interlocked, and the branch B, in falling, pulled down the branch A. This broke under the weight of the first, and, striking the operator on the head, inflicted a severe wound, causing his fall to the ground, a distance of twenty or thirty feet.

The Amputation of Large Branches.—Many of the lower branches previously shortened must afterwards be removed, from time to time, until the necessary height of trunk has been attained. The number of branches to be removed must, of course, depend on the height of the tree, the nature of the soil in which it grows, and its age when first operated on. Great caution should be observed in amputating large branches; small branches can, of course, be lopped off at any time without danger to the tree. We agree with De Courval that at



Fig. 28.—Danger of beginning the amputation of a long, heavy branch by a cut close to the trunk. A. Point at which the branch should be first cut. B. Branch badly cut; the butt striking the workman.

least three medium-sized branches may be safely removed from a tree in one year; although, if the branches are very large, not more than one, or perhaps two, should be cut at one time. It is always desirable, however, not to unnecessarily increase by the removal of living branches the wounds left on the trunk by the cutting off of dead branches or other excrescences.

Whenever it is necessary to amputate a large or long branch, it should be cut first in such a manner as to leave a stump two or three feet long before the final operation of cutting it close to the trunk is undertaken (Fig. 28). In this way the danger of tearing away by the

weight of the falling branch portions of the bark of the trunk may be avoided. This will prevent, too, the serious accidents which often occur when a large branch is cut at first close to the trunk, when the end striking the ground may cause the butt to fly up and throw down the workman. It is an indispensable condition of the prompt healing over and perfect circulation of sap that all wounds should be evenly cut and shaped as nearly as possible to the trunk of the tree. In order to secure this condition, the operation of amputating a branch should be commenced by making a notch on its lower side (A, Fig. 29). This notch should reach the middle of the branch; a second notch, B, should then be made on the upper side of the branch, but further from the trunk of the tree than the cut A. By adopting this method all danger, too, of injury to the trunk from the weight of the falling branch tearing away the bark will be avoided.



Fig. 29.—Method of preventing injury from the fall of a heavy branch by cutting notches on the lower and upper sides.

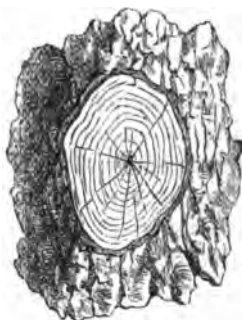


Fig. 30.—Proper appearance of a wound caused by the amputation of a large branch.

The operation of amputating a branch will not be complete, whatever method is employed, until the wound is made perfectly smooth (Fig. 30). The workman may do this with his hatchet used as a plane, the handle being held in one hand and the point of the blade in the other.

Use of Coal Tar in Dressing Wounds.—All wounds made on the tree in pruning should be covered with a coat of coal tar applied with an ordinary painter's brush.

The importance of observing the directions which have been given, however trivial or unimportant they may seem, will be apparent when it is understood that the entire success of the operation of pruning, and of the future production of timber, depends on the proper application of these rules.

It should always be borne in mind that a cut perfectly smooth, and as closely following the line of the trunk as circumstances will permit, is soon re-covered with healthy straight-grained wood. In

this connection it is well to quote from De Courval, who speaks with the authority of experience, and who has shown with many varieties of trees the correctness of his statements. "A casual examination," he says, "will show that between the surface, which has been cut smooth and treated with coal tar, and the new tissues which soon cover it, there is only the thinnest crack or fissure analogous to the natural cracks or openings which always appear in wood in seasoning, and which, as is well known, do not diminish its strength, elasticity, or value for all industrial purposes."

In the preceding pages the general rules which should be followed in pruning forest trees have been given; the special methods applicable to each of the four classes in which trees have been placed according to their age will now be briefly explained.

(To be continued.)

PREVENTION OF DAMPNES IN BUILDINGS.

HOWEVER commodious dwelling-houses may be, if they are subject to dampness, the comfort of those who inhabit them is seriously interfered with. Not only are they liable to suffer in health, but the furniture becomes damaged, and the wall paper becomes stained and discoloured, or it hangs loosely against the wall, in spite of all the fires that may be kept up to mitigate the evil. It may, perhaps, be some comfort to those who have to live in such dwellings to know that the evil may be prevented by a comparatively small outlay properly applied.

When prevention is decided upon, the cause must first be discovered, as it may arise from a damp or imperfectly drained site, or from the use of bad material in the erection of the building, such as soft, porous stone or inferior mortar, and the workmanship may also be sometimes faulty. In the first mentioned case, the ground floors will generally be more or less in a damp state, except where there is a vacuum, with arrangements for a free circulation of air under the floor; the walls will also, unless a layer of some non-penetrable material is laid on the surface of the ground course to prevent moisture ascending to the higher ones, be subject to dampness to a certain height, varying in extent according to the variety of stone with which the building is erected, and in intensity to the amount of moisture contained in the soil on which it stands. There are various methods recommended and practised for preventing damp thus rising, but the safest and most inexpensive remedy, and generally an effective one, is to cut a drain round the building, as near to it as can be done with safety, laying suitable-sized drain pipes in the bottom, and filling it up with broken stones to the surface. This

draws off any water that may be lodging in the foundations, and dries the site upon which the building stands, preventing at the same time moisture from entering into it.

When dampness is attributable to the porosity of the stones, or inferior mortar, its severity will depend on the way in which the building has been erected. If, as is generally the practice, the middle of the walls is packed with stones and mortar, so that the whole is formed into a solid mass, the dampness will be more severe than in those that are packed with small stones alone, the through stones, in the latter case, being the only means of conducting moisture from the outer surface to the inner one, whereas the whole body of the former acts in that capacity. If the mortar alone is to blame, it should be all picked clean off the external surface of the wall, and the joints properly cleaned out as far in as possible, and the whole re-pointed with good mortar, or, to make the job effectual, cement should be used instead, mixing, if Portland is used, two parts of pure sand to one of cement, and damping the joints with a wet brush before applying it, to make the mixture adhere to the stones.

Similar treatment to the foregoing should be resorted to when the workmanship is faulty, examples of which are often to be met with in rubble, or random walling, such as improperly bedded and badly-jointed stones, which, with the latter, necessitates the application of an undue quantity of mortar to cover the defects; this, apart from its liability to absorb moisture, affords further facilities for the egress of water by becoming cracked in the course of drying. In re-pointing, or "dashing," as the case may be, particular attention ought to be paid, so that if it has the appearance of "setting," or drying too quickly, it should be gone over, when about half-dry, with a damp brush, and then smoothed with the trowel to prevent it from cracking.

Where the stones, or where they and the mortar combined, are bad, various methods are adopted for preventing moisture from penetrating through them. One of these is the covering of the wall or gable—whichever part may be affected—with slates, nailing them to "lats" fixed into the wall, but giving them less "band" than in roofing; another is to cover the wall with a coating of cement, which is sometimes marked to imitate regular coursed stonework; tarring the exposed parts of buildings is also tried, but, although it may be a cheap and effectual method, the unsightly appearance it gives to a building precludes it from being very much adopted.

A method which we have practised here for a number of years, and one that has proved highly satisfactory, is to pick all the mortar off the external face of the walls, and clean out the joints, then re-pointing the whole with cement, as previously indicated. When they have become

properly dry, the surface is covered with a few coats of ship varnish: that for the first coat should be mixed with about 3 lbs. of white lead to a gallon of varnish, but the quantity must be regulated to suit the colour of the stone, that amount being sufficient for light-coloured stone, a less for darker; the lead gives the varnish greater consistency, and assists in filling up the pores. The second coat may have $1\frac{1}{2}$ lb. added to a gallon, and the last, if it requires another, can be applied pure, the whole when finished and dry having a bright, glittering appearance. The best way of laying it on is with a half-worn whitewash brush, and care ought to be taken to prevent it running by brushing it well in. The varnish costs only a few shillings per gallon, and if the walls are thoroughly dry before it is applied, and after the first coatings receive another at the end of every five or six years, no moisture can penetrate it.

ANDREW SLATER, JUN.

ON THE DRAINAGE OF LAND.

PERHAPS on no subject connected with land has there been so much written as on draining, and still the question does not seem to be exhausted. I was particularly struck with a remark made by Mr. Kay, at p. 114, Vol. IV., of the *Journal of Forestry*. He says:—"One would naturally inquire, What is the cause of drainage losing its effects, though the tiles may be as clear as when put in? The cause is self-evident. The newly-cut drain affords a large surface for draining off the water, the pipe or tile laid in the bottom of the drain being only a conductor for carrying off the water after being drawn from the surface soil, and the soil dug up in forming the drain through length of time ceases to act, becomes consolidated, and gradually ceases to produce effect." To remedy this he suggests that the drains be dug over again, or the soil loosened to a certain depth. I have not, however, seen this method tried, but as one having some practical experience in draining, I think it a very good suggestion and worthy of a trial. Again, Mr. D. S. Scott, p. 439, Vol. V., says: "Now I maintain that no field will suffer injury from any quantity of rain falling on its surface from the clouds;" of course I take this to mean no *permanent* injury. This is a view of the subject well worth further investigation, for if it is so, it would save very great expense and simplify the process of draining, and I am inclined to take the same view, with the exception of soils where there is a hard "pan" near the surface impervious to water; but in such a case it might be advisable to try the effect of subsoiling to break the impervious stratum before draining; at any rate no harm would be done by subsoiling. Having had over thirty years' experience in draining all

sorts of soils, and in all situations, I may be allowed to state my opinion and the conclusion come to. Before doing so, it may be as well to glance at the different modes of draining, and some of the opinions upon the same. First, we will take the primitive open drain, which with all its defects may still be used in woodland, and should not be lost sight of in any system of drainage; second, spring draining, known as Elkington's system, which may shortly be said to consist in taking a covered drain to a wet part of the field, tapping the springs as you go, and thus carrying off the underground water; and third, furrow draining, or the system brought out by Smith, of Deanston, and subsequently adopted with some modifications by Drainage Companies and most private individuals of late years, and on which millions of money have been spent. On the first, little need be said, as the merest tyro in the art can so arrange the drains as to distance apart, depth, slope, and so forth as to be effective, and if a mistake is made it is easily rectified. Not so with the Elkington system, which is, I consider, the most difficult, for not only must you have a knowledge of the subsoil, which may vary in the same field, but must be able to ascertain the extraneous source of the springs which affect the land; and this, I need hardly say, is often a matter of some difficulty; but unless this is done and the springs tapped, the drainage will not be complete; and if Mr. Scott's theory be correct, that we have nothing to fear from above, there must be no mistake about the underground supplies. About two years ago I was asked to drain a piece of ground which lay at the bottom of a slope, and may be described as a rusty swamp. After carefully considering the matter I adopted this plan, simply because I was well acquainted with the nature of the subsoil and the source of the evil. It was done with two, three, and four inch pipes, with six inches of gravel on the top, and I must say that in all my experience of drainage, I never saw such a change as was effected in this case. The owner writes me spontaneously, under date Aug. 27, 1881; "The meadow you drained is very satisfactory, and is throwing up a good quantity of fine herbage." I am therefore an advocate for spring draining. The third system of draining may be called the "frequent drains," and although it may answer the purpose, it does so at an enormous expense. Say it costs £10 per acre, this represents a burden on the land of 10s. at 5 per cent.—a rent in these times—and I firmly believe that this expensive system of drainage has encumbered the landowner almost beyond recovery, especially if the money was borrowed for the purpose, and that it has had more to do with breaking the farmers' backs than any one thing that can be named. It is simply marvellous to look back and think that the doctrines preached about this system should have had weight with men of common sense,

knowledge, and education. Let us hear one—I cannot name the author as it was in all the advocates' mouths: "The sun which the beneficent Creator intended to warm the earth is frustrated by the presence of water in it." Now a more (to use a strong expression) ignorant, one-sided view could not well be taken, for the beneficent Creator sends the rain, as the old hymn has it, "rain to bless the soil, and sun to warm the ground," whereas, on the contrary, these advocates spoke of water as a most noxious thing to be got rid of at any cost; forgetting in their enthusiasm that water enters largely into the composition of all animal and vegetable life, and that plants will no more live without water than without sun; indeed, it is a question which is the more essential.

It may be asked what is to be done with a stiff clay soil? To this I reply that (if there be no extraneous water) instead of draining it put the cost in farmyard manure upon it—

"Then plough deep,
While sluggards sleep,
And you'll have plenty of corn both
To sell and to keep."

I say to all connected with land, think well before spending a shilling on drainage.

In conclusion let it not be supposed that I say that the money spent on "frequent drains" has been thrown away. What I maintain is that the results of this system have not been commensurate with the cost.

JOHN SMITH.

A DAY AMONG THE WOODS OF HADDINGTONSHIRE.

NO part of the woods which adorn the county of East Lothian can be called natural in the sense in which we regard, say, the forests of Strathspey or Loch Rannoch side. They owe their existence to art; they are peculiarly the result of man's planting and man's protecting care; they are, in fact, plantations in the strictest sense of the word. It is on this account that a ramble through the woods of Haddingtonshire has so much interest for the arboriculturist, and is likely to afford so much instruction to the practical forester. With some such thoughts, and some such expectations, we gladly availed ourselves of the excursion of the Scottish Arboricultural Society, in order to pay a visit to scenes historic in their relation to Scottish woodlands.

The excursion took place on Wednesday, 5th October, and some forty members of the Society assembled at the Waverley Station, Edinburgh, a few minutes before seven o'clock, and took train for East Linton, where a halt was called for breakfast in the Station Hotel, the cheerful meal being

presided over by Sir Richard Temple, Bart., R. Hutchison, Esq., of Carlowrie, and Dr. Cleghorn, of Stravithie. At half-past eight o'clock quite a string of open carriages made their appearance at the hotel door, and, seats being speedily taken, a start was made for

WHITTINGHAME.

Crossing the river Tyne by the ancient bridge of the equally ancient village of Prestonkirk, and securing in passing a peep of the roaring linn which gives its modern name to the hamlet, the road pursued led us upward to the skirts of the Traprain Law—a huge conical mass of trap rock, rising 750 ft. above the sea level, and from this commanding point was obtained a glorious panoramic view not to be excelled in any part of the Lowlands of Scotland.

Whittinghame is the name of a parish in the south-eastern angle of the county of Haddington, and the estate is the property of Mr. A. J. Balfour, M.P., into whose family it passed, if we mistake not, from the Hays of Drummelzier, a branch of the Tweeddale Hays. The beauty of the estate and its fertility—the latter due in a great measure to the old red sandstone formation, which crops up at every turning, and which positively gives a colour to the whole landscape—are no less famous than the liberality of its possessors.

So great and progressive have been the improvements made upon Whittinghame, both in the way of planting and reclamation, that the aspect of the whole parish has been changed within the last fifty years; and finer farms, better “steadings,” trimmer hedgerows, more carefully tended plantations, cannot be found even in this district so justly celebrated as the granary of the Lowlands. The policies of Whittinghame are extensive, and “embrace within their ample compass a diversity of outline that presents every variety of landscape, richly-wooded dells through which the sparkling streamlet rushes on in its seaward course; long stretching meadows dotted over with flocks and herds, noble lawns and magnificent old trees” are encountered in our leisurely walk through the demesne.

Immediately after passing the gate, we come upon the site of the ancient parish church, not a vestige of which, however, now remains. The situation of the churchyard is clearly notified by the tablet erected to the memory of the Hays of Drummelzier, the former proprietors of the barony, many of whom are interred here. Laid out here also, in what a village urchin would call “a ghostly array,” are a number of stone coffins, the harvest of explorations conducted beneath the mounds of Traprain Law.

Immediately to the east of this venerable kirkyard there is a remarkable group of ashes, a tree which in a former age was very frequently planted in or near churchyards in Scotland. The largest is an extremely handsome tree, standing 95 ft. in height, with an umbrageous head. At one foot from the ground it is 14 ft. 5 in. in circumference, and 11 ft. 3 in. five feet up. It has a bole of 12 ft., when it divides into two grand limbs, 8 ft. 6 in. and 8 ft. 10 in. in girth respectively. The second tree of the group is 85 ft. high, 12 ft. 6 in. two feet from the ground, and 8 ft. 9 in. at six feet, with a bole of 20 ft.

The third is 65 ft. in height, and girths 9 ft. 6 in. at one foot, and 8 ft. 2 in. at five feet.

Making our way by a footpath on the crest of a bank which overhangs the river, we come to what may be described as the pinetum, from the number and variety of the coniferæ which dot the lawns, although there are admirable specimens of other species of trees.

The first to attract attention is a *Cedrus Atlantica*, which from a peculiar swell in the stem many of our party alleged to have been grafted in its youth. At first some were inclined to dub it a *Cedrus Libani*, but the character of the foliage and the habit of the branches induced the majority to vote for it as a representative of the Atlas cedar. It is a very handsome tree, and girthed 6 ft. 11 in. five feet from the ground.

Near this tree were a beautiful evergreen oak and a large and graceful fern-leaved beech. But little attention was paid to these when our eyes fell upon a eucalyptus of the proportions of a forest tree. At once measuring tapes and triangles were brought into requisition, and the history of this "interesting stranger" to Scottish Sylva was eagerly inquired after. This blue gum is *E. viminalis*, and was planted here in 1846—thirty-five years ago—having been brought to Scotland from Australia as a seedling by a member of the family. It grew rapidly and flourished till 1860-1, when it was cut down to the ground by the remarkable frosts of that terrible winter. The workmen began to take it out in the following summer, under the belief that it was dead, but fortunately left the stool, which the following year sent up shoots which have grown into splendid limbs, till a total height is reached of 53 ft. At one foot from the ground the tree girths 8 ft. 4 in., when it forks into four massive limbs, which rise upwards and outward, forming a tree of novel and yet striking character. It is curious to note that it stood last winter and the winter of 1879, when the thermometer here was several degrees below zero—an indication, surely, that the constitution of this variety of the blue gum may be hardened by judicious acclimatization.

A few yards from this exotic are several capital specimens of *Abies morinda* and *Cedrus Deodara*, and on a bank overlooking the kitchen garden are noteworthy Turkey oaks, a tulip tree in flower, and *Garrya elliptica*—the latter with a fine bushy head, though nipped severely by last year's frost.

Scattered up and down are many handsome specimens of *Araucaria imbricata*, from 30 to 32 ft. in height, with a spread of branches 14 ft. in diameter and girthing at five feet from the ground 3 ft. 3 in. to 3 ft. 9 in. Side by side with these araucarias were numerous tree-like Portugal laurels, 15 ft. high and 2 ft. 2 in. in circumference of stem five feet from the ground.

On a sloping lawn a spruce commanded attention from its stately habit and perfect clothing of branches to the turf. It had been grown under the name of *Picea pinsapo*, but the united wisdom of the company pronounced it *P. cephalonica*. It is 45 ft. in height, though from its handsome erect habit it looked much taller, girths 6 ft. 11 in. half a foot from the turf, where it divides into a great many branches, and so densely is it clothed with foliage to the grass that it was difficult to penetrate the mass of branches in order to obtain the measurement of the trunk.

Turning aside from these importations from foreign climes, we are introduced to a venerable indigenous tree, whose extraordinary size and historical associations render it an object worthy of the closest scrutiny. It is a yew growing on the brow of a gentle eminence, which it entirely covers; in fact, it has less the appearance of a tree than of an enormous bank of the densest foliage. The circumference of the branches, which sweep the turf on all sides, is close on a hundred yards, and in one direction the lateral spread of branches is 96 ft. At one point it is possible to creep below the branches so as to reach the stem, and, when this feat has been accomplished, the trouble is found to be well repaid. The visitor finds himself in an umbrageous chamber, whose gloomy character corresponds to the dark tradition which clings to the tree. The legend is that in the adjoining castle the Earls of Bothwell, Morton, Ruthven, and others of the Scottish nobles opposed to Darnley, the husband of Mary Queen of Scots, had met to discuss the means of getting rid of the obnoxious consort of the Queen; and that, repairing to the sequestered shade of the yew, they formally entered into a covenant to compass Darnley's death by blowing him up in the Kirk-o'-the-Field, at Edinburgh.

The great age of the tree renders it quite probable that tradition is correct, the more especially as Bothwell was very frequently in this neighbourhood immediately prior to the atrocious murder. Within this dark and leafy chamber there is, curiously enough, a spring of sweet, cold water, but it is now wisely imprisoned, and can only be tapped by means of a stop-cock. The trunk of the yew, which reminds one of the central pillar of a cathedral chapter-house, is 10 ft. in height before it sends out the branches which form the roofing of the canopy-like arched groining—to carry out the architectural simile. The stem is 11 ft. in circumference a foot from the ground, and 10 ft. exactly, five feet up.

Within a stone's-throw of the yew are the remains of the ancient castle of Whittinghame. Judging from the foundations yet traceable, this feudal stronghold must have been of vast extent. All that remains of it now is the great tower, or "keep," and the arms, with the boar's head carved above the door, show that it had belonged to the powerful Douglas family. This "keep" is still in a good state of preservation, and the rooms in two of the floors are occupied by the family of the forester on the estate. The ceilings of these rooms are worthy of close inspection by the artist and antiquary, from the exquisite modelling of the panels, albeit they are covered with many a score of coatings of whitewash. Ascending to the parapeted roof of the tower, the visitors commanded a magnificent prospect. On the one hand the scene is only closed in by the swelling contour of the Lammermoors, while on the other the eye ranges along the indented coast from Dunbar towards Aberlady Bay. Immediately beneath are the woods of Whittinghame, clothing the banks of the clear-streamed Papana, on a terrace of which rise the gracefully classic outlines of the mansion of the lord of the manor.

About one hundred and fifty yards east from the castle is a magnifice t

wych elm, 65 ft. high, 12 ft. in circumference five feet from the ground, and with a circumference of branches, which are feathered down to the turf, of 240 ft.

The carriages once more receive their freight, and we make a pleasant drive through the grounds. Descending into the valley of the Papana, we cross the stream by a handsome bridge, and ascend the further bank through grand avenues of beeches. At one point where a landslip had occurred we noticed the loving care of the proprietor for his arboricultural treasures, for there a beech, which threatened to come to grief, has been actually under-built, and then banked up.

The views afforded by the openings in the woods exhibit glimpses of the most perfect park scenery, but when we attain the high ground we fairly enter once more a forest glade.

In a nicely-sheltered opening we come upon a handsome *Wellingtonia gigantea*, 50 ft. high, and girthing 7 ft. 8 in. at one foot, and 5 ft. 4 in. at five feet. The fine proportions of this specimen are much admired, though it is not so large a tree as that at Castle Menzies, which was, in 1877, 44 ft. in height, and 9 ft. 10 in. in circumference of stem at one foot, and 8 ft. at five feet up. A *Picea pindrow* stands 35 ft. high, and in the same grove is a *P. nobilis* 65 ft. in height, 5 ft. 6 in. in girth at one foot, and 4 ft. 2 in. at five feet from the ground. The points of the branches near the base of the *P. nobilis* are browned from the effects of last winter's frost.

Time was on the wing, and there was no opportunity for inspecting the fine Grecian mansion-house. As we bowl along the fine road towards Biel, on the skirts of a thickly-timbered strath, we take note of the following trees, measured by Mr. Hutchison for his work on the "Old and Remarkable Trees of Scotland," and not previously referred to:—A sycamore 75 ft. high, with a bole of 25 ft., girthing at one foot from the ground 18 ft., and 13 ft. 4 in. at five feet; and three Spanish chestnuts: No. 1 on rising to a height of 60 ft., breaks into two limbs three feet from the ground, where it girths 12 ft. 10 in., and the branches are 7 ft. 11 in. and 7 ft. 5 in. respectively in circumference; No. 2, 55 ft. high, 8 ft. 11 in. in girth at one foot, and 7 ft. at five feet from the ground; No. 3, 50 ft. high, and 8 ft. 3 in. and 7 ft. 4 in. in circumference respectively, one and five feet up.

BIEL

The approach to Biel from the Whittinghame side is no less beautiful than that from Traprain, which is the more direct road for visitors whose only business is an inspection of the grounds and castle, whose history is identified no less with the family of Belhaven than with the annals of the ancient Scottish kingdom. To a stranger it was difficult to say where the beauties of Whittinghame ceased and those of Biel began—the two estates "march," as they say in this country; and a like taste has been displayed in the adornment of the landscape by judicious planting.

It may be that the narrowing of the range of view, from the thickness of the sylvan glades, betrayed that we were in the environs of Biel; but certainly it was not a matter of surprise when the carriages turned through

an unpretentious gate and into a spacious avenue of beeches, whose stately columns were thrown into relief by the background of tall underwood. Speedily we draw up at the garden entrance of the castellated mansion, and in a few minutes are busy inspecting the arboriculture of the nicely-kept policies.

Biel is the property of Lady Mary Nisbet Hamilton, and has been in the possession of the Hamilton family for at least three centuries. Sir John Hamilton, of Biel, a son of Sir James Hamilton, of Broomhill, was in 1647 created by Charles I. Lord Belhaven, a title derived from a village a few miles distant from Biel on the sea-coast. The second Lord Belhaven—the husband of a granddaughter of the first—was a prominent patriot in his day, and took a large share in public affairs, being especially distinguished for his unflinching opposition to the measures of Charles II.'s Government in Scotland. He was imprisoned for his opposition to the Test Act, and after the revolution he contributed much to settling the crown of Scotland upon William and Mary.

Since the second Lord Belhaven's time Biel House or Castle has been vastly improved by successive owners, and now it is an imposing structure covering a vast extent of ground. The best view of it is from the south, overlooking the Papana, which here plays an important part in beautifying the grounds. The banks of the stream at this point slope pretty rapidly on both sides, and advantage has been taken of the irregularity of the ground to produce quite a unique specimen of gardening. As the house is built at an elevation of upwards of 100 ft. above the level of the stream, from which it is separated by a grassy haugh of considerable breadth, the intervening slope has been scarped into three successive terraces, the lowest one a little above the level of the haugh, and the highest connecting itself with the walls of the mansion, to which it forms a promenade. The terraces are of considerable length, and extend east and west not less than 300 ft. In addition to a broad gravel walk, they possess sufficient breadth for a range of flower-beds so arranged as to produce a magnificent floral display.

Let us descend and examine the splendid trees which are visible from this terrace. *En route*, we are attracted on the first terrace by the greenhouses, into which we peep, and find the largest specimen of the *Gnetum*, or Horsetail Tree of India, quite an ornament, with its feathery head, to the spacious conservatory in which it stands. Outside is a *Wisteria sinensis* 58 yards in length—a plant which in flower must form a superb adornment to the wall. Just at the bottom of the last terrace we come upon a venerable and picturesque sycamore, beautiful even in its decay. The most striking peculiarity of it is its gnarled character, which makes it irregular in the extreme as to growth. For instance, it girths 13 ft. 8 in. at a foot from the ground, 14 ft. 3 in. at five feet, and 20 ft. at eighteen feet. It stands 80 ft. high, but its head is woefully tattered. A few yards from this hoary giant is a fine walnut, but, before leaving the sycamores, it may be well to give the measurements of other splendid specimens in the grounds.

In a sheltered spot rises No. 1 to a height of 100 ft., which girths 13 ft.

at three feet from the ground, 12 ft. 7 in. at five feet, and 12 ft. at nine feet, while its bole is 50 ft. high. No. 2 is 75 ft. high, and girths 12 ft. at one foot up; 9 ft. 8 in. at five feet. No. 3 is 100 ft. high, girths 11 ft. 11 in. at one foot up, and 8 ft. 7 in. at five feet. No. 4 is 80 ft. high, 11 ft. 3 in. in circumference at one foot, and 8 ft. 9 in. at five feet. No. 5 is 85 ft. high, girths 10 ft. 3 in. at one foot, and 9 ft. 7 in. at five feet. No. 6 is 90 ft. high, girths 12 ft. 7 in. at one foot, and 9 ft. 7 in. at five feet. No. 7 is 95 ft. high, girths 15 ft. 4 in. at one foot, and 10 ft. 7 in. at five feet. No. 8 is 84 ft. girths 16 ft. 7 in. at one foot, and 10 ft. 8 in. at five feet. No. 9 is 90 ft. high, girths 13 ft. one foot up, and 9 ft. 7 in. five feet from the ground. No. 10 is 70 ft. high, and girths 11 ft. and 8 ft. 8 in. respectively. No. 11 is 78 ft. high, and is 14 ft. and 10 ft. 6 in. respectively in circumference at one and five feet from the turf; while No. 12 is 95 ft. in height, and measures round the trunk 12 ft. 4 in., and 11 ft. 6 in., at one and five feet respectively.

At the bridge which crosses the Papana is an ash 63 ft. in height, and dividing into three large limbs 12 ft. up. At a foot from the ground it is 12 ft. 10 in. in circumference, and 13 ft. 2 in. at five feet, and Loudon states that in 1812 this ash girthed 11 ft. 4 in. five feet from the earth.

On the lawn is a fine *Magnolia conspicua*, 40 ft. high, a nice *Cryptomeria japonica*, with a beautiful head, and a purple beech 55 ft. high, whose spread of bronze-leaved branches is fully 70 ft.

There are several very handsome specimens of *Picea nobilis*, but perhaps the greatest attraction of all to a pure arboriculturist are three cedars, representative of the three great varieties *Cedrus Libani*, *Cedrus Atlantica*, and *Cedrus Deodara*.

A mere glance at these respective trees at once sets at rest the doubts which have been frequently expressed as to whether *Atlantica* and *Libani* were really distinct varieties. That they are is here patent to the veriest tyro in arboricultural knowledge. Perhaps all that here and now can be said in the matter of the dispute is that there might have been only one variety of cedar, and that climatic influences have first originated and then intensified differences so plainly manifest to the most untrained eye in the cedar from Lebanon, in the cedar from the Atlas Mountains, and in the cedar (*Deodar*) from the Himalayas. The Cedar of Lebanon occupies the central spot of the river-side lawn, and a noble tree it is, worthy of the situation, and worthy of the event whose planting it commemorated; for its growth has been as material as the growth of the country, whereas its noble planter feared he was raising a memorial of the political extinction and degradation of North Britain. It was planted in 1707 by the then Lord Belhaven, and now stands some 75 ft. in height. At a foot from the ground the stem girths 17 ft. 6 in., and 18 ft. 2 in. at four feet, when it breaks up into innumerable branches, which are carried upward like a cluster of pillars for 20 ft. or so, and then spread out into magnificent layers of rich green-clothed limbs. The horizontal character of the branches of *Cedrus Libani* is specially marked, and whether from near or far the tree is a noble and a fair sight

to behold. Some twenty-five years ago it seemed to be failing in vigour, and the prospective decay of so interesting and historic a tree gave great concern to the proprietress. Mr. John McLaren, now of Hopetoun, and then of Biel, had the turf removed for a considerable space round the base of the tree, and the ground covered with a thick layer of decayed cow manure. From that day it took a new lease of life, and now in the glory of its treehood it promises to flourish for centuries to come.

Forty or fifty yards from this Monarch of the Forest rises a *Cedrus Atlantica*, something like a cluster of columns, and presenting to the eye a pyramidal outline. The colour of the foliage is quite distinct from that of *C. Libani*, while the habit of the branches is more erect, making its growth, as we have said, that of a pyramid. As the trunk bursts into a number of columnar branches a very short distance from the ground, we can only measure it at one point, and there it is 18 ft. 8 in. in girth. It is believed to have also been planted in 1707.

On a sloping bank, a short distance away, is a handsome *Cedrus Deodara*, with its pendulous light green foliage; and drooping over the terrace walls weresome grand masses of Savin, *Juniperus sabina*, which attracted much notice.

There was no time to explore further the woodland treasures of Biel, and ascending to the upper terrace we gain the carriages, and start for Tynninghame, passing through the great avenue which leads from the Dunbar Road to Biel. This avenue is quite characteristic in its way, extending upwards of a mile in a straight line. It is formed by an outer row of beeches and oaks, while there is an inner line of deodars and Irish yews, the formal habit of the latter presenting in such a situation quite a unique and not at all an unpleasant appearance.

TYNNINGHAME.

In the bracing and bright weather with which we were favoured the drive to Tynninghame, through a rich agricultural country, was most delightful. Crossing the Edinburgh and Dunbar highway which separates the Biel and the Tynninghame estates, we turn into a parish road which leads us past the old village of Tynninghame. Here we noticed the red-tiled roofs of the cottages put to a novel use. Apple trees are trained against the walls which face the south and then up the tiles of the roof, the latter affording a considerable amount of heat and ripening the fruit in a perfect manner. It is noteworthy also that the trees do not suffer from frosts in the same degree as others not so favourably planted. From the quaint rural village to Binning Woods we begin to pass between the immense holly hedges for which Tynninghame is famous. These hedges are 20 ft. high and upwards, and still present an interesting sight, though they appear to have been neglected some years ago. There are many gaps, and the continuity of dense shoots and foliage, which, it is said, enabled the boys of the neighbourhood, in former days, to walk on the tops of the fences to school, has now been broken. Judiciously cut down and the gaps planted, there is no reason why these historical landmarks might not be made as dense and beautiful as ever they were. It was

about one o'clock when we reached the Five Gates, where is the principal entrance to the far-famed Binning Woods.

It is unnecessary here and now to give any account of the Haddington family—Tynninghame has been in the possession of the Earls of Haddington for over 300 years—nor of the planting of the estate by the sixth Earl and his Countess, Ellen, sister of the first Earl of Hopetoun. A charming sketch of the family, and of how it came to pass that this part of the country from the sea to Whitekirk hill was covered with such magnificent woods, appeared a few months ago in the *Journal of Forestry* (vol. iv., pp. 641-9). Enough is said when we relate that when Thomas, sixth Earl, came into possession of Tynninghame, there were only thirteen acres underwood, and that now the woodland covers over 800 acres, almost the whole of it having been planted in his lifetime from 1707 onwards. The largest plantation is what is known as the Binning Wood, extending to 400 acres, and connected with Brownrig and Ravensheugh Woods, the latter encroaching on high water mark, by means of two fine avenues. Binning Wood was laid out somewhat in the style of that at Fontainebleau. At irregularly fixed points there are four central openings, and from these there diverge thirteen different rides. The *ensemble* from any one of these circular openings in the woods is enchanting, and the members of our party were inclined to linger in and wander through these lovely avenues the livelong afternoon. The pleasure of the pathless wood is here enhanced by the clearings of art, and any one at all mindful of sylvan scenery in its most charming aspects could not fail, as none of our company failed, to be more than delighted with the good fortune which had enabled them to enjoy the purest woodland pleasures. The predominant tree is the beech, and nothing could exceed the stately impressiveness of many of the "rides." But there are scattered throughout the wood, groves and single specimens of most of our cultivated forest trees, and this commingling of leafage and variety of outline of trunk and branch lent additional charm to the scene and pleasure to the arboriculturists. Throughout the afternoon the sun shone in all the splendour of declining autumn, and as the light streamed down through the overarching boughs and cast strange flitting shadows upon the carpet of the brightest russet, the glow and play of colour and transparent shadows were marvellously lovely.

None of the beeches were measured, but the tape was brought into requisition for a number of other varieties, and we give them as they were taken. A group of Scots fir, No. 1, 80 ft. high, girth at one foot 10 ft. 9 in., and at five feet 9 ft. 4 in., the head most picturesque and ragged, with a glorious green colour of foliage, and the bark a clear red, which shone like burnished copper in the sun, while in the shade exhibiting the snake markings so characteristic of the true native Scots fir. No. 2 girthed 11 ft. 5 in. at a foot from the ground, and stood 82 ft. high. No. 3 girthed 12 ft. 6 in. at one foot, and 10 ft. 10 in. at five feet, while there was a clean bole of 30 ft., with scarcely any taper. A Spanish chestnut in the very depth of the wood showed the characteristic whorl in the bark of the stem as if it were a screw. Its height was 80 ft., with a bole of 45 ft.; its

circumference of stem was at one foot 16 ft. 6 in., and at five feet 13 ft. 8 in. What Lord Haddington calls the "King of the Woods," is a silver fir, 101 ft. high, and fifteen feet from the ground it forks into seven lordly branches. At two feet from the ground it girths 14 ft. 10 in., and at five feet 13 ft. 3 in. The whole character of this tree is noble, and its clear silver bark is remarkable.

Before leaving Binning Wood the whole party, to the number of about sixty, were entertained to a sumptuous dinner, set out on the greensward in one of the loveliest of the circular openings in the forest. In the unavoidable absence of the Earl of Haddington, who had so generously provided this delightful *al fresco* banquet, Mr. R. Hutchison presided, supported by Sir Richard Temple, Bart., and Mr. W. McCorquodale, and Dr. Cleghorn occupied the vice-chair. The noble host was enthusiastically toasted, as were also the proprietors of the other estates visited during the day.

The dinner, it may be said, was served on a table consisting of a single plank in breadth of silver spruce, 28½ in. wide and 3 in. thick, cut 21 ft. in length from a tree grown in the wood.

From Binning Wood we proceeded seawards, by way of the Garleton Walk, or Lord Thomas's Rhododendron Avenue. Originally a spacious avenue, a mile and a half in a straight line, it has been planted by rhododendrons, most of them hardy Indian varieties, many of which have grown to the great proportions found on the slopes of the Himalayas. Even now, with their dark glistening foliage, they present a magnificent appearance, but when the plants are in flower the walk must be a glorious spectacle; and we are informed that it attracts thousands of spectators every season.

Brownrig, through which we passed, is a fine mixed wood, about eighty years old, but the object of our journey seawards was to inspect the Ravensheugh and the Links Woods, which extend down to the seashore at Belhaven Bay and Ravensheugh Sands. Here is the successful result of an experiment in planting sands which dates one hundred and forty years before the celebrated Culbin plantation, and even about a century before the sand dunes of the coast of the Bay of Biscay were planted by the French Government, and of which one hears so much. It is not a matter of tradition, but of actual historic fact, that the sands now covered by these fine woods were so treacherous that horses and vehicles have been known to disappear in them, engulfed in their treacherous quicksands, and never heard of more. Earl Thomas set about the work in a purpose-like manner, and with a knowledge of woodcraft somewhat extraordinary, when we recollect that it was about two hundred years ago. About high water mark he planted a thick hedge or cover of sea buckthorn (*Hippophaë rhamnoides*), which, revelling in the loose sand, soon took firm hold and spread rapidly, while throwing up its lanceolate leaves, now adorned with yellow berries, to a height of 12 to 14 ft. Behind this barrier Scots fir, beech, and oak were planted. The outermost ranks of the forest trees do not count for much; they are thin, stunted, starved-like plants, but they improve as you advance, and only a few yards from the buckthorn hedge you find straight, healthy, well-grown timber.

But not only have Scots fir, beech, and oak done well so near the sea, but sycamore (called in Scotland the plane) has thriven in a most wonderful manner. In Little Binning Wood there is a long stretch of fine sycamore plantation, every stick of which, as a forester remarked, is worth from £3 to £5. From Fir Links Wood the party proceeded—after enjoying for half an hour the grand view of rock and sea at Belhaven Bay—up a noble avenue of spacious width to Tynninghame House. Here they were received by the Earl of Haddington, and conducted through the public rooms of the noble mansion. The family portraits from “Tam o’ the Cowgate,” the founder of the Haddington branch of the great Hamilton family, down to the present courtly Earl, and painted by such world-famous artists as Vandyke, Reynolds, Gainsborough, Raeburn, &c., were duly admired, while specially interesting were original portraits of Mary Queen of Scots and her rival, Good Queen Bess. In his lordship’s study the curious were shown the manuscript and a first edition of Earl Thomas’s work on *Arboriculture*, which he wrote some time in the beginning of last century in the form of a series of letters to his son, Lord Binning. This was the first book on practical forestry published in Scotland.

Immediately to the left front of the mansion is a variegated plane, a fine, tall, handsome tree, with a most attractive head, and girthing in the stem 11 ft. 10 in. one foot up, and 9 ft. 10 in. at five feet. Quite near it is a Robinia, or false acacia. Lord Haddington directed the attention of the party to a disease which had attacked, and was slowly killing, many of the fine hollies which here grow so thickly as almost to form an impenetrable thicket. There seemed to be two efficient causes of the mortal injury being done to the hollies—a little scarlet fungus and a cancer. Were the fungus and cancer independent of each other, or was one the cause of the other, and was the fungus the cause of the cancer or the cancer of the fungus? were questions pertinently asked. It seemed, after due consultation among so many eminent tree doctors, to be admitted that the fungus was a growth dependent on the condition and surroundings of the trees, that the attack of the fungus produced the cancer, and that the cancer was the ultimate disease which killed off the plants, and the prescription unanimously given as a cure was to thin the plantations and allow more light and air, but especially air amongst the stems. So long as the plants were so overcrowded, so long would the disease exist and flourish. Last winter the frost was intense at Tynninghame, the thermometer registering 7 deg. below zero, and among the effects of this extreme cold were the splitting of a grand tree of *Arbutus unedo*, and the cutting down to the ground of many fine laurestines which had stood 18 ft. high.

Among what might be called the pet giants in close proximity to the mansion are a beech with a bole of 40 ft., and girthing 15 ft. 6 in. at one foot from the ground, and 12 ft. 3 in. at five feet. The growth of this fine tree is $4\frac{1}{4}$ in. in circumference of stem since 25th September, 1880. The next is an oak 95 ft. high, with a bole of 35 ft., and girthing 12 ft. 7 in., at one foot from the ground. So close to one of the walls of the offices, and so closed in by other

trees and underwood that it might be said to be hidden, is a Spanish chestnut girthing 16 ft. 8 in. at one foot, and 12 ft. 8 in. at five feet from the ground. At the north-east corner of the house is an oak 13 ft. 4 in. in circumference of bole a foot up, and 10 ft. 5 in. five feet up; and close beside it is a very stately *Wellingtonia* 45 ft. in height. Among the isolated hollies, of which there are many fine specimens in the park, we measured one which rises 57 ft. in height, and girths 7 ft. 2 in. in the stem one foot up, and 6 ft. 3 in. at five feet. It has a bole of 15 ft. before the first heavy limb branches out.

The sun had sunk to rest when, after walking through garden and park, the party emerged on the highway at Tynninghame village, and joining there the carriages, a sharp drive in the gathering shades of evening was made to Dunbar *via* West Barnes and Belhaven. After a hurried but acceptable tea in the "King's Arms," the company made for the railway station, and, taking possession of their special carriage attached to a local train, reached Edinburgh shortly before nine o'clock, after some fourteen hours' continuous enjoyable rambling among the woods of Haddingtonshire.

THE LAW OF ENTAIL.

ONE of the best measures passed this Session relates to the management of the estates of Redcastle and Farradare, in Banffshire, which may be worthy of mention as a curious commentary on land laws and their applications. The estates were placed under strict entail in 1865, in favour of Colonel Baillie in life rent and of his son, the Right Hon. Henry J. Baillie, and his heirs male in fee. Failing heirs male, the estates were entailed on Mr. Baillie of Dochfour, and after him on the same series of heirs entitled to succeed to the Dochfour estates. By the predecease of the heirs male of Mr. Henry Baillie, it became apparent that the Redcastle estates would devolve upon the Dochfour family to the exclusion of Mr. Henry Baillie's family, and that the expensive improvements effected by Colonel Baillie and his son would be lost to the family unless some remedy were meanwhile provided.

For many years prior to deed of entail, and up to the period of his death, Colonel Baillie had expended large sums of money and exercised great care in planting and cultivating the timber upon the estates, and Mr. Henry Baillie since his succession had followed the same course. The timber, on a recent valuation, was found to be of the intrinsic value of upwards of £32,000, while the matured and marketable timber was worth upwards of £22,000. The present heir, being entitled to cut down the matured timber, had been advised to reimburse himself for his own and his father's expenditure by selling the same, but being unwilling to affect the peculiar beauty and attractiveness of the estate, he offered to abandon all right to cut down the timber for a sum of £20,000.

The next heir seems readily to have closed with this offer, and the Act now passed sanctions the agreement, and empowers the present heir to charge by bond as freely as if the property were held in fee simple with the sum of £20,000, and £1,000 as the expenses of the Act, the heir binding himself not to cut timber during his occupancy, except for estate purposes. Provision is made for the gradual extinction of the debt, by means of a sinking fund spread over 25 years, but in the event of the timber being sooner cut, the proceeds are to be applied to an earlier discharge of the burden.—*Land.*

THE HOME FARM IN DECEMBER.

ARABLE LAND.—Continue to plough up stubbles in preparation for spring and summer crops—oats, barley, peas, beans, mangolds, &c.—and also plough up close to the folds upon turnips, to prevent the washing away of manure. Cart on manures, chalk, marl, &c., in frosty weather.

Hop gardens may at once be dug where the soil is heavy and needs the benefit of winter frosts. But, unless the digging is well done, ploughing is to be preferred. Plant up dead hills with bedded sets, and cart on new poles where required.

Live Stock.—The heavy work of wheat sowing being over, horses may now be profitably employed in carting, and have an allowance of pulped roots or carrots, in addition to their corn and chaff. All fattening cattle should be tied up in the lodges or shut up in warm yards, and have some cake or corn. Provide the ewes with plenty of dry food in wet weather. Avoid overfeeding with turnips. Lambs should also be well fed and kept upon sound land.

Irrigated meadows should have regular attention, and the flow of water should be discontinued whenever a thick scum appears upon the surface.

Manures may be carted into the fields for spring use. Fermentation may be checked by carting over the heaps, and thus consolidating them, and the escape of ammonia be prevented by scattering gypsum over the clamps and mixing it freely with the manure.


Drainage.—Push on drainage operations both upon arable and pasture lands, taking care to have good outlets in safe places, but not too many of them. Secure the open mouths of drains by cross-bars or a small grating, and brick up the sides.

Poultry of all kinds, and more especially the geese and turkeys, should be pushed forward for the Christmas market.

Miscellaneous Work.—Cut off, trim, or plash old hedges, plant new ones, fill up gaps in hedgerows, thrash out and deliver corn, prune orchard trees, repair farm roads and gates, and lay in manures for spring use.

Estate work for the farm horses will consist in the cartage of fuel, timber from the plantations, drain pipes and roofing tiles, lime, sand, and timber for repairs, and materials for the roads.

A. J. B.





ENGLAND.

MILD weather has favoured the tree-planter, who should now be well advanced with his work. A better season we never remember—no frosts nor cold east winds to do any damage to the plants during removal. The greatest success may be expected to follow the work already done; and those who are behindhand should make every effort to get on. Clay lands still work stiff and tough in many places, especially where holing was carried out late in the autumn. The practice of cutting away a large quantity of the roots from those plants intended to go out into the woodlands cannot be too strongly reprehended. By holding the plant in one hand and trimming off the roots with a billhook held in the other, as is often done, the greater portion of the fibrous root is removed. A moderate root-pruning for nursery transplanting may be advisable; but when filling up in the woodlands the less of this the better.

Plantation thinning should go on as rapidly as possible, care being taken not to thin too severely upon exposed sites. Much mischief was done in this way in many places last year, and the trees have suffered severely. Where the trees have hitherto been allowed to grow up tolerably close together, thin very gradually, spreading the entire work over several years.

Dig young plantations, and hoe, dig, and well clean hedgerows. The proper maintenance of a good live bottom is possible only where clean cultivation is carried out. Also fill up vacant spaces in hedgerows with hawthorn, beech, or other plants suited to the soil. Strong three-year old plants will with attention soon make a strong compact fence.

Seeds of the coniferæ may now be gathered and laid out to dry in airy places. These being preserved in the cones, are better thrashed out and sown in the spring upon beds of fine light soil, about 3 or 4 ft. in breadth. The acorn, hazel-nut, chestnut, and walnut should already be in the soil. Where the land is wet, place the seeds upon the level ground, and cover them over by means of the soil shovelled from the intermediate alleys. Drills struck out beneath the surface of the wet land draw the water, to the injury of the seeds.

For nursery use and for forming composts, leaves may now be raked up, carted, and formed into heaps, either alone or with an admixture

of soil. Ditch scourings should also be collected and mixed with lime or fermenting manure. Placed as bottoms to the clamps they receive the soakage and become valuable as manure.

The felling of all kinds of timber the bark of which is of no marketable value may be proceeded with, and thus an early clearance of the falls may be made. Coppice falling will also proceed during open weather. The produce may be laid in drifts for trimming out during frosts when cutting would not be advisable. More timber may be obtained by grubbing in open lands; but within the confines of the wood itself the axe and the saw alone are admissible. Great care should be taken in felling large timber in close plantations; and an experienced hand should guide the operations.

In the nursery manure, dig, trench, transplant, and undercut, as required, and roughly turn up beds for spring work.

All ditches and watercourses should be scoured and kept free from leaves, pinnocks be repaired and kept open, and new open drains cut wherever required.

A. J. BURROWS.

Pluckley, Kent.

SCOTLAND.

FROM the 18th to the 22nd of last month a series of gales were experienced here, and I believe were general all over Scotland, culminating in a perfect hurricane from the south-west on the morning of the latter date, and for about an hour accompanied by vivid flashes of lightning and heavy thunder peals. A considerable amount of damage has been done to plantations and standard trees; not a few have been uprooted, twisted and broken.

The weather hitherto has been very favourable for planting operations, which may be continued during the early part of the month. Should frost set in to interfere with the work of planting during part of the day, the hands might be employed during that time in forming roads in the enclosure being planted, or other work convenient to it. Look over recently-formed plantations, and firm all plants which may have been loosened by the late winds. Complete all necessary preparations for spring planting.

Continue the felling of timber and the thinning of plantations as recommended last month. Hedgerow timber should now be cut, so that advantage may be taken of frosty weather to remove it. The plantations thinned at this season should be chiefly those from which saleable timber is to be had, and care should be taken in thinning not to overdo it.

Where a quantity of home timber is annually used for estate repairs, it should, as far as possible, be cut up during the winter months, and also a supply of fencing material for the coming spring and summer.

Clear all open drains and ditches of fallen leaves. Dig or trench nursery ground as before recommended. Collect seeds of larch, Scotch fir, holly, mountain ash, hawthorn, &c., if not already done, and pit them, mixed with sand. Clean leaves off policy grounds, and cart them, together with road cleanings, &c., into heaps for compost.

Finish metalling roads, and execute ground work connected with alterations and improvements in the policies on the estate.

D. SCOTT.

Darnaway, N.B.

IRELAND.

THE season hitherto has been extremely favourable for planting, so that much of this work will now be done, which will enable the forester to turn his attention to other operations for a time. Falling timber will form the chief occupation of the month. All trees which are intended to be removed from the fields and pleasure-grounds should now be cut. This month is a very good time for thinning ornamental clumps and groves, trimming shrubberies and making alterations about the mansion-house. Arterial drainage should also be begun. It is always desirable to carry out such work at a season which least interferes with agricultural occupations. During very stormy weather the men may be usefully employed raising gravel or quarrying stone.

The severe storms of last month, particularly that of the 31st of October and the 1st of November, have in most districts increased the work on the forester's hands, by the removal of blown-over trees and broken limbs. In this neighbourhood the gale on the evening of the 31st of October was something terrific, far exceeding any previous storm this season.

D. SYM SCOTT.

Ballinacourte, Tipperary.



NURSERY TREATMENT OF PLANTS.

SIR,—Remarking in your last issue the suggestion of Mr. Mackenzie, that the nursery treatment of plants, so far as relates to their future stability in resisting the gales, should be considered in these pages, and being one of those who believe that a certain course of treatment is essential to the future success and well-being of the plantations of which these trees may form a part, I venture to offer a few remarks thereon.

At the outset, it may be remarked that plants should receive, according to their nature and habit, a course of treatment in the nursery to qualify them for successfully adapting themselves to the soil and position in which they are to be placed, and to attain these ends they must be reared with a stiff, robust habit of growth, and well furnished with roots spread equally round the plant.

All young trees before being removed to plantations should be transplanted from the seed-beds into positions in the nursery approaching, where practicable, those into which they are ultimately to be transferred, and the state of the plants ought to be regulated to suit the soil and site. Thus for bare and exposed tracts small robust plants well furnished with fibres are necessary, larger ones with similar roots for those less exposed, and for sheltered positions, with a good open loam, those with moderately furnished roots will answer, provided they are able to sustain their vigour; but for open, sandy, and stiff, tenacious soils the plants cannot be too well rooted. I will not enter here into the

question of the most suitable sizes of plants for planting, and need only state that this must be regulated by attendant circumstances, such as exposure, the nature of the ground, and the natural covering that may be growing upon it.

In my opinion the non-stability of the trees, where that exists, is not traceable to any elaborate treatment they receive in their younger stages, but in some cases it may be owing, especially with conifers, to the manner of performing the necessary operations in the nursery. As already stated, the roots ought to spread out equally all round the plant, and not, as frequently is the case, all on one side, for when such are planted, by some of the methods at present in vogue, they are placed permanently in the ground with their roots directed in one direction, so that fresh roots require to strike out from the base of the plant in an opposite one, and they never attain the same vigour and strength as the others; it is therefore not surprising that numerous trees are heeled over when a strong wind strikes them from a point opposite to that of their roots.

The methods adopted when transplanting in the nursery are "dibbling" and "laying," but to have properly formed roots these operations must be efficiently carried out. In the case of small coniferous plants, with a nursery soil of a loose and open character, dibbling is to be preferred before laying, as better developed roots are formed if they are dropped direct down in the opening formed by the dibble; but if the opening so made is not of sufficient capacity, either as to depth

or width, the roots inevitably get doubled up with their points near the surface, which causes them to be of an unnatural form, and thereby hurtful for a time to the growth of the plants and to the further development of their underground ramifications. Laying is performed by cutting a trench in the form of a right or acute angle, deep enough for the roots of the plants to be inserted, and to project direct down to their full extent, and when that is done they will be formed in a natural manner; but when the trench is opened, as is too often done, to a depth quite insufficient for the requirements of the roots, the consequence is that they are placed at something like a right angle to the stem, and when not covered in that position they are generally doubled up and pressed against the face of the trench by the operator when pressing in the loose soil to cover them, so that they become shaped according to the way in which they are placed; and, if they be again transplanted, the contortions of the roots are further aggravated. I do not mean to aver that when such are planted and growing in plantations they will not be capable of withstanding storms of wind, but they will be more ready to succumb than those whose roots have been grown in a form more nearly approaching those in a natural state.

There are particular soils on which plantations are more liable to suffer than on others, such as those of a loose, open, and thin character, and on thin soils with a cold, tenacious, or impervious stratum underneath; on these, whether the trees have grown there direct from seed, from seedlings planted there, or from plants prepared in the nursery, they would be equally liable to suffer.

In conclusion I may state that what ought to be more looked to in treating plants in the nursery is greater atten-

tion and care in transplanting, so that roots may be produced of a more natural formation, and when they are transferred from there to the forests they should be placed in the ground in as natural a position as possible.

With a view to nullify the effects of winds upon plantations, belts of trees, which are most capable of weathering the storms, should be planted on all their most exposed boundaries, and particular attention must be paid to these, if they are to be of any benefit, both in their arrangement when planting, and in after years. Trees of a low-growing habit ought to be kept on the outer margin, and taller ones behind, and they should never be allowed to become crowded together, but have plenty of room for encouraging the development of side branches, and extending their roots underground. Hillocks and ridges might also be taken advantage of, where these would be likely to afford shelter to other portions of the plantation, arranging and treating the trees upon them for that purpose.

ANDREW SLATER, JUN.,
Wyreside Cottage, Lancaster.

SIR,—I fully endorse Mr. Mackenzie's opinion of the injurious effects of transplanting some forest trees, especially the oak, as the tap-root sent out from the acorn has a peculiar sharpness, which enables it to penetrate to a depth equal to the height of the tree: a remarkable proof of this may be seen on the Downton Castle Estate, near Ludlow. The river Lune has worn a channel to a great depth through the shelly rocks of the Siluran strata which prevail in that locality, and on the top of the precipitous banks some of the finest oaks in the district were growing some thirty years ago, the roots of which might be traced, running through the interstices of

the rock to a depth of 60 to 80 ft. till they reached the water.

WM. MAINWARING.

SIR,—One of your correspondents at page 527, in writing on this subject, goes, I think, a little beyond the mark when he says that the elaborate nursery treatment of trees is fast growing to be pernicious to their ultimate well-doing. The above is an assertion which I cannot see any apparent reason for making. I have now been engaged in the cultivation of trees and plants quite sixty years, and I have tried to become acquainted with plants from the *Bissus flora aquæ* that grows upon damp glass, and other things, very readily, and in great abundance in all marshy and damp places, to the *Wellingtonia* and *Eucalyptus*, that tower in majestic grandeur 200 to 300 ft. above the earth, beside which Solomon's hyssop and cedar of Lebanon sink into insignificance. How many grades of floral and sylvan beauty exist between these two extreme points of vegetation! Yet I never heard till I saw it in your columns that we were fast destroying the vital energies of our glorious trees. When I cast my mind's eye through some of the splendid forests in Perthshire, and coming south to sweet Somerset, and gloriously wooded Devon, I am at a loss to realize your correspondent's charge against our many highly cultivated nurseries, that spread far and wide in luxuriant beauty throughout the land, and have been for centuries the storehouses from which our magnificent forests, &c., have hitherto been supplied. Your correspondent recommends *one year's seedlings, or even seed itself*, to be only used in raising the forests of the future! I have just finished planting an enclosure of about five to six acres. This piece of ground was as rough a lot as any one could possibly see—brambles, old roots, boulders, and other rough material covered

the plot I had to operate upon. Now, had I gone with my pockets full of various seed to plant in it, or perhaps one year old spruce, larch, or Scotch fir, one year's plants, half-inch high, when would the proprietor see these trees as high as himself? and echo answers, When? Although I am a nurseryman—may I say it?—with as much knowledge of trees as most of my brethren of the spade, yet I fail to be able to foresee a time when our glorious landscape will be covered by the plan your correspondent recommends, with woods superior to what they are now.

JOHN SCOTT.

Merriott, Somerset.

EFFECTS OF THE GALE IN THE NEW FOREST.

SIR,—I am sorry to notice that I omitted to state in my account of the late severe gale that eight or nine of the beautiful old beech trees in Mark Ash Wood were either blown down or seriously damaged, as also two or three in the adjacent Knight Wood, and two oaks in Queen's Bower. Though decayed, and of but little commercial value, every tree that is lost from these fine old woods is a sad loss from a picturesque point of view.

GERALD LASCELLES.

Deputy-Surveyor, New Forest.

Lyndhurst, Nov. 3.

SOWING LARCH SEED.

SIR,—I want to plant a few acres of land with larch seeds. The land seems just the kind for larch, but my nurseryman tells me that I shall not succeed, because the land is not good enough to start plants. I should give the land a good ploughing, and leave it fallow for the winter. I should be glad to know if you think I am likely to have any success with this plan, and if so,

please let me know the best place in Scotland to get the seed from.

W. H. BAILLIE.

43, Norfolk Square,
Hyde Park, W.

[Any respectable firm of nursery-men can supply genuine Scotch larch seed.—Ed.]

THE DEVELOPMENT OF ROOTS, &c.

SIR,—On looking over the letters from correspondents to the *Journal* for last month, I see attention is drawn to the great number of wind-blown trees throughout the country, both coniferous and hardwood. This is due in a great measure to insufficient drainage of woodland, and from this cause more trees are blown down than otherwise. It is not so much from elaborate nursery treatment of plants as from want of proper management after they are planted that so many trees are blown down.

The best system for larch, Scotch fir, spruce, and silver fir, is to plant two years' seedlings one year transplanted. Seeds or young seedlings ought not to be planted except in very exposed hillsides, or on thin soil near to rock.

I am not so decided as to hardwoods. On estates where game is much preserved, few if any whins, broom, or briers are allowed to be cut; this is very hurtful to trees in their younger stages. When this is left undone, trees get too much drawn and slender, and are readily blown over. Every forester ought to be encouraged in this department of his duties, and should have a discretionary power to do all that is practicable until the trees get advanced. If this department of his work is neglected, together with untimely thinning, trees will continue to fall, whether seedlings or transplants. In the natural forests at Rothiemurchus few trees are blown

down on dry land; this corroborates the statements I have advocated.

In Morayshire, on some estates, few trees are reported windblown; this is due to the dry, porous nature of the soil, with the mutual shelter derived from the adjoining hills, and not so much from seedlings being substituted for transplants. The roots get developed into the subsoil, and are thereby more able to resist the high winds that occasionally visit this country. Seedlings of exotic trees should not be planted; these kinds ought all to be somewhat advanced in size, and have plenty of space to develop their roots and branches. That being done, the roots will grow deeper and deeper the higher the wind blows, as much as to say, the more you pull the more I hold.

This is a brief outline of my experience and judgment on this subject.

THOMAS DOW.

West Idvies.

GROWTH OF CONIFEROUS TREE STUMPS.

SIR,—A short time since I noticed several larch stumps in a state of active growth and continuing to produce annual layers of woody matter after being deprived of their stem and branches.

Is this an unusual circumstance, or does it occur commonly; also has this strange growth been noticed on any other coniferous trees besides the larch and silver fir?

Perhaps some of your numerous readers would record their observations.

EMERGO.

THE HORSE CHESTNUT AS A SHADE TREE.

SIR,—As this is the season for planting I think it would be desirable to draw the attention of landowners and agents to the advantages of the horse chestnut for shade in pasture fields. I have made inquiries

for several years past from foresters and woodwards as to whether they had ever seen a horse chestnut that had been struck by lightning; during an experience of over forty years I have never seen or heard of a single instance.

The luxuriant foliage and majestic appearance of this tree, combined with its handsome blossom in spring and the richness of its autumnal tints, render it a charming object in any landscape; its value as a timber tree is not very much, as it is, like the sycamore, subject to taint, but if cut up whilst fresh it is beautifully white, and I fancy that now the "fret-saw" has come into such general use the wood may be utilized for ornamental carving.

All farmers know the great value of ample shade for animals during the hot months, but we often hear of the disastrous effects of a thunder-storm, both to bipeds and quadrupeds, when sheltering from the rain, by the subtle fluid which is proving so valuable to us for light, and for motive-power when under control, but which is so erratic and fatal when launched from the batteries of the skies.

WM. MAINWARING.

Brimfield, Nov. 11, 1881.

TREES FOR PLANTING NEAR BRICK-KILNS.

SIR,—Can you inform me through the medium of your columns what trees or shrubs are suitable for planting close by brick-kilns? The smoke from these kilns has completely destroyed the oak trees, hazel, birch, and thorn bushes growing in their immediate vicinity.

W. S.

RAISING FALLEN TREES.

SIR,—May I offer a few suggestions through your columns to Lord Middleton about the raising of his large trees? He says he has got one

raised which is now 80 ft. high; to keep it in its place nothing is better than heavy stones, as they will keep down the roots, and be otherwise beneficial to the tree by condensing the atmosphere over them, thus keeping the roots in a moderate state of moistness. If I had it to do, I would make a regular cairn around the trees, and when they are up keep them so by placing long and strong chains to them, well fastened around the top, *i.e.*, about 2 ft. below it, and placed in a triangle, letting the lower ends of the chains be 9 or 10 ft. distant from the base of the tree. Neither chains nor ropes will be of any use unless they are fixed nearly at the top; for the higher up they are the greater will be the purchase they will have; of course they must be well secured at the bottom by having strong oaken posts let into the ground at an angle of about 45 deg., with their heads projecting outwards, so as to bear the strain they may have to endure. I may say, whatever mode of propping is adopted, let it be thoroughly secure, so as to prevent the tree canting over, as such might prove fatal to it. As to the sap rising to the top, I see no fear of that as soon as spring begins to clothe her children in green. I cut the head of a lime two years ago; it is 40 ft. high, and the sap rose in great abundance, sending out shoots 6 to 8 ft. long the first year; the tree is now clothed with long branches or spray from top to bottom.

J. SCOTT.

Merriott, Somerset.

MISS ORMEROD'S "MANUAL OF INJURIOUS INSECTS."

In answer to "Aphis" and other correspondents, Miss Ormerod's book is published by Messrs. W. [Swan Sonnenschein, & Allen, Paternoster Square, London, and Messrs. J. Menzies & Co., Hanover Street, Edinburgh, price three shillings.



The education and training of foresters has now become a subject of the greatest importance to this country, and must receive in the future a much greater share of the attention of the Government and our educational authorities than they have hitherto devoted to it. Considering the vital interests which are at stake, both at home and in every one of our widely-spread dependencies, it is surprising that so much apathy has been displayed in the question till the present time, by those to whom the interests and welfare of the empire have been entrusted. The spasmodic efforts of the Indian Government have had no avail, from the simple fact that those to whom the direction of the Indian Forest Department has been entrusted are notoriously opposed to any scheme which involves a British training for the candidates for appointments in the department. Why such unreasoning hostility should be displayed by Dr. Brandis and his coadjutors to every proposition for establishing a Forest School in Britain, for the education and training of foresters for every part of the globe to which British dominion extends, it is difficult to guess; but that is no reason why our home authorities should stand idly by with stolid indifference while the interests of the country are being sacrificed through the prejudice of an able but mistaken public servant. The time has come when those in office must accommodate themselves to the times, and subordinate preconceived ideas to the urgent wants of the country. All persons of ex-

perience, except those whose training has disqualified them from being impartial judges, give their verdict emphatically in favour of establishing a Forest School for training and educating our foresters at home. The views expressed on the subject by Sir Richard Temple, Bart., and other eminent authorities at the last meeting of the Scottish Arboricultural Society, are those which are held by every experienced man who is qualified to give an unprejudiced opinion. It is therefore the duty of the Government to give their earnest attention to the subject, and inaugurate a scheme for the proper education and training of young men who wish to devote themselves to the art and science of forestry.

* *

It has never been supposed that this country was devoid of educational facilities of the highest order in our schools and colleges, but for the practical training of foresters it has been constantly insinuated by the opponents of a British Forest School, that it is impossible to find in this country sufficient extent of forest, and practical skill, for training the young men. Such ridiculous fallacies can only be entertained by those who are ignorant of the extent of our forest lands, both public and private, and the admirable skill with which some of the most extensive of them are managed. The royal forests and woodlands extend in all to something like 200,000 acres, of which the New Forest and Forest of Dean are the largest areas. Either of these splendid forests contains scope and area enough for the prac-

tical working of the most complete and extensive of Forest Schools ; and we have it on high authority that, after an inspection by competent judges on a recent occasion, the Forest of Dean was declared to be a model of a forest for a Forest School. Then we have the great Scotch private forests, of which Athole, Strathspey, Darnaway, and Scone are notable examples of as skilful management and admirable forestry as are to be found anywhere on the continent of Europe. With these magnificent resources at our command, they only require to be properly organized to form the most complete training school for young foresters which it is possible for any country to furnish at the present day.

* *

Such an institution is certain to receive every support and encouragement from landowners and all interested in the prosperity of forests and woodlands, especially if it is founded on sound practical principles, and conducted with energy and economy. Students will flock to it in numbers, as the profession is an attractive one to young men, and those who display intelligence and ability are certain to meet their reward in remunerative employment at home and abroad. The training acquired in a properly conducted Forest School will qualify a man for filling any office of trust and discretion connected with landed property, as well as giving him a first-class knowledge of forestry pure and simple.

* *

Even with the present costly system of training in the French Forest Schools, we find there is no lack of young men who are eager to get the few appointments annually dispensed by the Forest Department of India. In looking over the "Table of Marks of Merit" awarded at a competitive examination in January, 1880—the last we have

seen—we find that thirty-seven young men presented themselves for five appointments. Of these, eleven failed in the obligatory part, and the rest obtained marks ranging from 1,149 to 3,380, the maximum of marks being 5,050, which shows a very moderate average, considering the comparatively easy nature of the examination papers. In fact, it can only be said that the five selected candidates passed moderately well, with respectively 3,380, 3,263, 3,246, 3,195, and 3,111 marks. Two other candidates just obtained *half* of the maximum number of marks. The other nineteen were under that moderate number, and may be said to have literally failed. Such a dubious result can only be explained by a natural inaptitude to understand the nature and wants of forestry among the comparatively wealthy class from which the students are at present drawn ; and until forest education is brought within the means of every intelligent and industrious young man we cannot expect much improvement. In a Forest School in Britain young men, with a natural inclination to learn forestry, can be most thoroughly trained for less than half the present cost, and those of moderate means could always manage to meet the demands made on them by such an institution, which the excessive costliness of the present system effectually prevents them ever dreaming of being able to do.

* *

The Annual Report of the Commissioners of Her Majesty's Woods, Forests, and Land Revenues, always forms a subject of interest to all concerned in the management of landed property, and more generally to the public at large, who are directly interested in the profits derived from the immense national property administered by the Commissioners on behalf of the Crown. On the accession of Her Majesty to the Crown, an Act was passed by which, for the

annual sum of £385,000, the income of the woods, forests, and land revenues was surrendered to the public during the life of Her Majesty. The surplus income has exceeded that amount since the year 1875, having reached as much as £410,000 in the years 1877, 1878, and 1879, and in 1880 and 1881 it has been £390,000. The public is thus reaping an appreciable advantage at the present time from the bargain; and if it had not been for the drawback which has had to be allowed to the Crown tenants for their losses during the recent bad seasons, the two latter years would have proved as productive as the three previous ones. These allowances amounted, during the year ending 31st March last, to the large sum of £20,175 0s. 6d., or about 20 per cent. on the rental.

..

From the Fifty-ninth Report, for the year ending on the 31st of March last, which is now before us, we find that the income from Windsor parks and woods, extending to about 14,000 acres, is stated at £4,111 1s. 5d., and the expenditure at £23,377 12s. 2d., being an excess of expenditure over income of £17,266 10s. 9d., which may be set down as a fair price to pay for the maintenance of such a magnificent royal domain. The rents and royalties of the land in other parts of England, under the charge of Mr. Gore, extending to 70,000 acres, amounted during the said year to £350,549 13s. 3d., subject to the allowances made to tenants as already mentioned. The cost of collecting this large sum, including the superintendence of the erection of new farm buildings, execution of repairs, and drainage works, amounted to the sum of £11,142 7s. 9d., or about 3½ per cent. upon the gross amount, which is a larger cost than usual, owing to extensive works being carried on for the purpose of providing new and

improved accommodation for stock upon a considerable number of farms.

Among other items of income from the lands under the charge of Mr. Gore are the sales of the produce of the woodlands on the Crown estates, other than the royal forests, in various parts of England. This produce appears to have been all sold as "timber" during the year under notice. Stagsden Woods, in Beds, produced £349 2s. 3d.; Delamere Woods, Cheshire, £701 6s. 6d.; Chopwell Woods, Durham, £49 8s. 9d.; Bicknor Manor, Gloucester, £62s. 2d.; Eltham Woods and Estate, Kent, £269 12s. 1d.; Torver Woods, Lancaster, £4 19s. 4d.; Hazelborough and Salcey Woods, Northampton, £1,229 5s. 4d.; Egham Estate, Esher Estate and Woods, Surrey, £636 1s.; Poynings Woods, Sussex, £28 3s.; and Bishops Cannings, Wilts, £6 8s. 4d.; amounting in all to the sum of £3,280 8s. 9d. Against this, there is no clear statement given of the expenditure on these woodlands, which is a serious omission that ought to be rectified in future reports. So far as we can make out the confused details given, we may set down the expenditure as follows:—Stagsden Woods, wages of woodkeeper, labourers, &c., £89 19s. 7d.; Delamere Woods, wages of woodmen and labourers, £381 10s. 3d.; Chopwell Woods, wages, &c., £317 5s. 1d.; Eltham Woods, wages, &c., £137 0s. 1d.; Aldingham, Lancaster, salary of woodkeeper, £5 5s.; Hazelborough and Salcey Woods, wages, &c., £203 3s.; Egham, cleaning plantations, £15 14s.; Esher Woods, wages, &c., £324 18s. 10d.; Poynings Woods, wages, &c., £17 0s. 2d.; and Bishops Cannings, salary £10; amounting in all to £1,502 16s.; which, deducted from the income, leaves a surplus of £1,778 12s. 9d.; but no information is given of the area from which this profit is

derived, and therefore it is impossible to give an idea of the rate per acre.

* *

In the New Forest, which extends to about 63,000 acres, we find the income has been £10,716 9s. 1d.; while the expenditure for the year amounts to £12,068 12s. We have had reason in former years to dwell at considerable length on the excessive mismanagement displayed by the Government, in the reckless way by which the interests of the Crown have been sacrificed to the greed of the "commoners" in the New Forest. Instead of this valuable State property being a source of public revenue, it has now become a drag on the public purse. Why should the Government retain for a single day a property of the kind, by which the country is losing heavily? A deficit of £1,361 19s. 5d. is too much for the public to pay for all the benefits derived by the nation at large from the New Forest. There is no reason why an expensive staff should be kept up for the sole purpose apparently of wasting public money, and it would be decidedly better to hand over the whole to the "commoners," for their private use, than to go on in the manner which at present prevails. But it may be reasonably asked, is there no way of remedying this, and rendering this extensive property fairly profitable to the Crown and the public, who are in reality the lawful owners of it? We say, Yes. Let the commoners' "rights" be specified, and discharged in a just and lawful manner. What then remains of the forest will be indisputably State property, which, by skilful management, can be made as profitable as the adjoining private property. We shall then have the satisfaction of congratulating the management on the flourishing state of its finances, instead of criticising the ruinously wasteful policy followed.

* *

The value of sales of produce in the New Forest during the year is stated

at £8,360 11s. 6d., which includes the receipts for timber, bark, poles, fagots, cordwood, and all other tree produce, except the timber and fuel wood used in the forest, valued at £266 14s. 10d. Rents of houses, lands, &c., forest dues, and sporting licences, with a few small items, make up the total amount of income to £10,716 9s. 1d., as already stated. The expenditure comprises among other items £2,395 16s. 6d. for planting, new works, and other improvements; materials and artificers' bills being charged with £2,273 2s. 9d.; labour with £81 13s. 9d.; while the value of the trees and plants used is set down at the small sum of £41, showing that planting operations have not been carried on to any appreciable extent. For maintenance and general management, the heavy sum of £3,061 7s. is charged, made up as follows—Deputy Surveyor, salary £500, allowances £170; First Assistant, salary £150, allowances £30; Second and Third Assistants, salary £120, and allowances £30 each; clerk, £100; foresters, four at £80 each, and one at £52 per annum, with a house allowance to one of them of £30; woodmen, twelve at 15s. per week, attendance of regarders, £1 10s.; and sums amounting to £955 9s. 1d. paid to the late Deputy Surveyor and his assistant. Besides the above, the sum of £4,357 2s. has been expended on labour, and artificers' bills and materials amount to £484 18s. 9d., to which may be added £257 2s. 1d. charged for expenses of forest officers (£64 4s. 2d.); expenses of sales (£85 19s.); implements, &c. (£2 1s. 6d.); destruction of vermin (£30); and miscellaneous (£74 17s. 5d.); making a grand total of expenditure for management, maintenance, and labour of £8,160 9s. 10d., exclusive of all rates, taxes, and tithes, legal expenses, compassionate allowances, and other charges, which do not properly come under

the head of keeping and maintaining the forest. These figures show a very poor result for such a costly management, which require a thorough investigation to satisfy the public mind that the nation is not being unjustly dealt with by the commoners of the New Forest.

* *

Turning to the Forest of Dean, we find that a property of about one-third the size of the New Forest produces a profit of £3,329 12s. 11d., the income being £8,227 8s. 6d., and the expenditure £4,897 15s. 7d. Here the charges for management, labour, and maintenance amount to £3,852 2s. 5d., and the sales of forest produce bring £6,377 10s. 2d., leaving a balance of £2,525 7s. 9d. on the right side of the ledger. In every respect this appears to be the best managed of all the royal forests, and one that annually brings in a fair return to the public exchequer. We are not surprised, therefore, that the eminent foreign professors of forestry who recently visited this country unanimously awarded it the high honour of being the best model of a properly managed forest which they saw in England, and the results we have quoted decidedly bear out that unbiased opinion.

* *

Of the minor royal forests, High-meadow Woods show a profit on the year of £2,774 7s. 11d.; Alice Holt Woods, a profit of £382 19s. 9d.; Woolmer Woods, a profit of £624; Bere Woods, a profit of £302 4s. 2d., and Parkhurst Woods, a deficit of £120 1s. 8d.; leaving a clear profit on these woods of £3,963 10s. 2d. The total receipts from the royal forests and woodlands thus amount to £27,858 6s. 1d., and the expenditure upon them to £21,418 2s. 5d.; leaving a balance or profit from about 100,000 acres of land of £5,940 3s. 8d., or an average of 1s. 2d. per acre. Such a miserable result is a stigma on our forest administration, and a lamentable loss to the public.

The series of storms which have visited this country during the last two months have been unusually destructive to trees and plantations. Those parts of the country which escaped the fearful hurricane of the 14th October have in many instances been visited since by as dreadful calamities, which have uprooted trees and committed wide-spread devastation of a nature unfortunately equal in many cases to the destruction caused by the first storm. Over the greater portions of Ireland and Scotland the woods and plantations have suffered severely by the more recent gales, especially on the north and west coasts. From these districts we hear of giant trees and thriving woods being swept down by the fierce blast, and much damage and destruction done to crops and all manner of landed property. We will be glad to receive information from our readers concerning the damage done in their neighbourhood by these storms, so that our record may be as complete as possible of the immense loss the country has sustained by the destruction of such a vast number of valuable woods and individually interesting trees.

* *

One point in connection with the power of trees to withstand these terrible gales is worthy of remark, as it conclusively shows the great value of having woods managed in the best possible manner, by skilled foresters of judgment and discretion. All other matters being equal, the woods which have invariably suffered by far the worst are those which have been neglected or mismanaged in the thinning. Where woods have been allowed to grow too thick, or where they have been in any degree injudiciously overthinned, there destruction is seen most rampant. Many woods have thus been ruined by careless neglect, or, what is still more culpable, careless thinning. These two evils will always be avoided by skilled and competent men, who have forethought and

experience to guide them. It is quite true that woods have been devastated which have been treated in the most skilful and approved manner, but their example only adds force to the fact that their numbers are but few in comparison to those which have been badly managed and are destroyed in consequence.

* *

A fertile source of damage to trees during a gale of wind is a want of attention at the proper time to stop contending leaders. In all forest trees a forked stem is most objectionable, and during a storm there is nothing that oftener happens than the breaking off of one of these stems, generally on the leeward side, which, if it does not split the stem to the ground, injures it so much as to render it liable to be readily affected with rot, and detracts largely from its value as timber. Hardwood trees are most liable to this defect, and it should be the duty of every forester to go over the woods periodically, say every three years, to remove or shorten back all contending leaders, and such branches as show signs of overgrowth, or threaten interference with the due extension of the leader and proportionate growth of the stem. This may be done easily and expeditiously until the trees reach a height of 45 to 50 ft., after which they are generally able to keep their well-balanced form; but even above that height if contending leaders should appear, it will always be found to pay to stop all but the one leader by getting at the others while in a small state with a sharp knife, or with an averuncator, fixed on the end of a long handle.

* *

At the meeting of the Meteorological Society on November 16th, the president, Mr. G. J. Symons, F.R.S., read a very interesting paper on the gale of October 13-14. Referring to the overthrow of trees as an indication of the force of the storm, and basing his remarks on the re-

turns published in last month's *Journal of Forestry*, Mr. Symons mentioned that, in the first place, the effect of wind upon trees is obviously dependent on their state of leafage; secondly, there is the class of tree which has three different influences: (a) the shape of trunk, branches, &c., e.g., a fir, and an oak; (b) the pliability or otherwise of the wood, the nature of the root-hold, whether deep or superficial; and, lastly (c) there is the age of the trees.

* *

Another fact which is somewhat apt to be forgotten was also alluded to by Mr. Symons, viz., that the havoc is partly proportional to the time which has elapsed since a previous storm; because, if the interval be short, the previous storm may be assumed to have removed the frail ones, and therefore the havoc will be small; if the interval be long, many trees will have had time to become weak and rotten, and the damage will appear excessive.

* *

As regards soil, the effect is that of affording variable hold to the roots, and the overthrow of a dozen trees in one place where the existence of a bed of rock compels the roots to remain near the surface may not indicate so much force as the overthrow of a single deeply-rooted specimen. There is another condition of soil which should not be neglected, namely, the level of the subsoil water, the tenacity of the soil varying greatly with its hygroscopic state.

* *

From America we continue to hear very favourable accounts of the hardy catalpa (*Catalpa speciosa*). It is stated that Illinois nurserymen are raising it by the million. It is of exceedingly fast growth, and its timber is reported to be "almost indestructible," and for railroad ties invaluable. One railroad company has just planted a large forest of it in Kansas.

Accounts reach us from some of the north-eastern states of America, more particularly from Maine, of the great ravages made by insects on the spruce trees, which are said to be dying in large numbers from their attacks. The insect, supposed to be the *Urocerus albicornus*, is stated to be about an inch long, with wings which spread to two inches, and great alarm is being occasioned by its destructive attacks.

* *

Since the recent forest fires in Canada the question as to how to prevent them has been under considerable discussion. The matter was recently considered at a meeting of the Ontario Agricultural Association, held at London, Canada, when Professor Bucke alleged that more trees had been destroyed in Canada by forest fires than had ever been exported. He held that Government should become the producer of forests, on account of the long time it takes hardwood trees to come to maturity—eighty to 100 years. One of the largest exporters in the country expressed the opinion that in twenty years there would be no pine to export from Canada.

* *

We hear of some very successful efforts in the direction of raising large trees blown down by the violent gale of last month. In a beautiful old avenue leading to Dunse Castle, a dozen fine old limes, some of them 75 ft. in height and 9 ft. in circumference four feet up, have been restored to an upright position, with every prospect of their growing and flourishing for many years to come. Two lime trees 130 years old at Highfield, the residence of Mrs. Marson, near Heckfield, Hants, have also been successfully raised. The trees, which were about 12 ft. in girth, and upwards of 90 ft. in height, were pollarded at about 30 ft. from the ground before being raised, and the weight of

timber thus remaining was estimated at a little over two tons.

* *

An extensive area of hilly ground on the Invercauld Estate, Braemar, N.B., has been prepared for planting during the past year, by proper fencing, to protect it from the inroads of deer and smaller vermin from the adjoining forest. The ground, which lies immediately to the north-west of Invercauld House, and is locally called the "Black Park," was formerly covered with a splendid forest of Scots fir, which was sold and cut down some fifteen years ago. Having rested the land for so many years, it is now deemed ready for producing healthy and vigorous trees, and planting operations have been carried on this autumn by which it is again laid under a crop. The sorts of trees used consist principally of Scots fir, larch, and spruce, with a few other hardy kinds in suitable places.

* *

In travelling through the country we notice that in many parts there is an extraordinarily abundant crop of haws on the thorns; so much so as to give them quite a crimson appearance in the sunshine. Hollies also are seen in great splendour, their abundant clusters of coral-red berries brightening up dull November days in a gay and pleasing manner. Nor is the sombre yew less interesting when more closely inspected, as it is generally seen thickly covered by its brilliant red berries, which are hidden from distant view amid the dark and thickly-set foliage. Should the winter again prove severe, there is an ample store of fruit on these and other trees to supply with wholesome food the numerous tribe of feathered songsters which aid our labours and cheer the woods and groves so sweetly at more genial seasons.

* *

We learn that Mr. John Sadler, Curator of the Royal Botanic Gar-

dens, Edinburgh, has been appointed Curator of the new Arboretum, by the Lords Commissioners of Her Majesty's Treasury. The appointment of Mr. Sadler must be viewed with satisfaction by all to whom are known his eminent qualifications for the efficient discharge of the important duties attached to such an office; and we trust that the Lords Commissioners will see that the remuneration awarded is fully commensurate to the importance of the duties, and that the Curator has proper laws and means whereby to enable him to make the ground an *educational Arboretum* in the best sense of the term.

* *

We note that there is a dissolution of partnership in the firm of Dickson and Turnbull, the old-established nurserymen at Perth, by the retirement of Mrs. J. D. Anderson, and that the business will be continued under the old style by Mr. J. A. Anderson, and his son, Mr. A. T. Anderson.

* *

One of the most interesting books

which we ever perused, and one which every cultivator of the soil ought to read, is Dr. Charles Darwin's latest work, "*The Formation of Vegetable Mould through the Action of Earthworms.*" These lowly creatures receive but scant courtesy from the tillers of the soil when their presence is supposed to be prejudicial to crops, but after a study of Dr. Darwin's book we think they will view with greater leniency the somewhat repulsive appearance and troublesome habits of worms, which they will learn are more than redeemed by the important part they play in the formation of the rich mould in which crops and plants of many kinds most delight to luxuriate. There are few books which will better repay perusal by the forester and every tiller of the earth, and we strongly commend it to all who are interested in productiveness of soils, as well as to those who devote their attention to the wonderful workings of the lower forms of creation for the benefit of man and animated nature.

:O:

OUR FOREIGN EXCHANGES.

FROM Denmark has been received the *Tidsskrift for Skovbrug Udgivet af Prof. P. E. Müller*, Professor of Forest Economy in the Copenhagen College of Forestry, Agriculture, and Rural Economy; and from Bohemia have been received regularly numbers of the *Haj*, the *Domacnost*, and the *Lovena*.

A *résumé* of a lecture by Professor N. A. Jossa, Professor of Metallurgy at the St. Petersburg School of Mines—(1) on the manufacture of pig iron in Russia, (2) the manufacture of ferro-manganese, and (3) detailed information in regard to the charcoals employed, published in the *Journal of the United*

States Association of Charcoal Iron Workers—has also been received.

In the Italian *Nuova Rivista Forestale* is a report of an excursion in the Silesian dominions of the Archduke Albert, by the students of the Austrian Imperial and Royal Superior School of Agriculture and Forestry, in the prosecution of the study of forest science, with details of observations made, and a paper on the culture of the sumach (*Rhus coriaria*).

In the *Revue des Eaux et Forêts*, No. 9, is a paper entitled "*The Pine Plantation of La Sologne; the Disasters of 1879-1880, and Means of Repairing Them*," a reprint of the last chapter of a memoir

in the culture of the pine plantations at Sologne, presented by the author, M. Gérard, to the National Society of Agriculture of France, which embodies much valuable information bearing on pine plantations on sand wastes.

In the Spanish *Revista de Montes* is a paper by Sr. Laguna on a prickly oak found in Italy, and various oaks found in Spain, with

like characteristics; a Kalendar of the School of Forestry in the Escorial for the academic year just commenced; names of professors of the several branches of study, and of the students in different stages of the course, and others giving details of the progress of *repoblacion*, or replanting of cleared forest land.

JOHN C. BROWN.

—:O:—

THE GALE OF OCTOBER 14th.

The following additional letters received since the publication of our last number, respecting the effects of the memorable October storm, may be of some interest:—

BERWICKSHIRE.—Dunse Castle.—The damage done here by the gale of the 14th October, is hardly describable. A space of about twenty acres is quite levelled; at another place in the same state is ten acres, and so on down to a single tree, principally larch and Scotch and spruce fir, with from twenty to eighty cubic feet of timber in them. There is a beautiful avenue of lime trees leading to the Castle very much disfigured, thirteen trees being uprooted, and falling on the others, have disfigured them very much. Some of them measured 12 ft. in circumference at three feet from the ground. Most of the trees blown over in the park are limes, but there are a great many large oak and beech upset all over the estate, many of which measure 12 ft. in circumference. I believe there are between 50,000 and 60,000 blown down.—Being busily engaged raising the fallen lime trees in the Avenue, I have found out nothing more about the number of trees blown over on the estate, but I have had timber merchants from the north of England and the south and west of Scotland, and they say that it is by far the largest fall they have seen, and some of them had seen Tynninghame. We have been very successful in raising the lime trees in the Avenue, which I finished on the 19th ult.; in height they are from 43 to 75 ft., and I put one up on the 17th ult., with 240 ft. cube in it. Up to Saturday, the 19th ult., there were fourteen trees put up, and there are a few more yet to be put up in the park: the circumference of the largest lime is 13 ft.—ROBERT R. BUCHANAN.

DUMFRIESSHIRE.—Canonbie.—At your request I send you a brief account of the damage done by the wind storm of October 14th on the Buccleuch Estate in Eskdale. I am sorry I have had no time to do so until now. The wind on that date blew a perfect hurricane here; and wherever its force was concentrated between valleys or into any particular passage it carried almost everything before it. It is useless to say that any one kind of tree suffered more than another, for everything depended upon exposure and the hold each tree had of the ground. Surface-rooted trees on thin soils suffered most, together with those trees carrying a large quantity of foliage. It follows with reason that trees bearing a large foliage are like ships with all their sails set, and are much more liable to suffer than those trees bare of leaves. To my mind it was more a matter of exposure than that of any particular trees which suffered most on this or any other estate. In the parish of Langholm we had 747 trees blown down, consisting of 117 oaks, 193 larch, 343 spruce, 9 Scotch fir, 31 ash, 17 elm, 26 beech, 4 sycamore, 3 birch, and 4 Weymouth pines. In the parish of Ewes there were only 79 trees blown down, more than the half of which were spruce. In the parish of Canonbie 189 trees were blown over, 70 of which were oak, 10 larch, 42 spruce, 24 Scotch, 17 ash, 3 elm, 3 beech, and 3 sycamore. Of course you can gather very little information from these numbers, because the trees which suffered most were the only

kinds on these particular parts of the estate. In the parish of Newcastleton, for instance, 2,076 trees were blown over, consisting for the most part of spruce. The cause of this large number of trees blown over was the extreme exposure to the gale, together with the thin wet soil on which the trees were planted. On the Eildon Hall Estate 420 trees were blown over, which consisted solely of those trees that happened to be most exposed to the storm. Many trees have been broken over and branches also broken throughout the plantations on the estate, and much damage done to their appearance, though not actually destroyed, and may recover their form. Although the gale which blew on the 14th was undoubtedly very severe, yet this district has suffered less than from the January wind storm of 1839, when whole plantations were completely levelled. Since the 14th October there have been strong winds, which have done considerable damage to trees in this neighbourhood. No doubt the extra attention to early thinning and keeping plantations in better order have done much to assist trees in resisting severe wind storms, since they tend to promote the spread of roots, and consequently enable them to keep a firmer hold of the ground on which the trees are planted.

—WILLIAM DOUGHTY.

EAST LOTHIAN.—Archerfield.—A terrible disaster befell the grand old avenue at Archerfield, when the gale of the 14th October had reached its greatest force. In a few minutes the fine beeches, forming the side of the avenue opposed to the fury of the wind, were laid prostrate before it, and tore up immense masses of earth with their roots. The great force with which the giant trees went down made them leap backwards, the strong roots and spurs on the lee-side snapping like mere threads. Some seventy splendid trees have thus been lost in an avenue extending about a quarter of a mile, from the front of the mansion to the gardens. Had the hurricane continued a short time longer, the leeward side of the avenue must have also gone down before it, as the fall of the side next the wind had left it quite exposed to its fury. As it was, several trees in the row were lost in the general smash. A large limb of a sycamore broke off and fell on the roof of the gardener's house, but luckily did not break through. All over the extensive policies and plantations, which extend to the sea at the mouth of the Firth of Forth, there are great numbers of trees blown down, and it will take many months before the effects of the storm can be cleared away. At the old castle of Dirleton, famed for its beautiful flower garden, commanding site, and grand remains of feudal times, great havoc has been made among the fine old trees which form such an interesting feature of the place. A fine old elm that had grown for ages on the ruined ramparts of the castle was uprooted and smashed to pieces in its fall. The greatest loss, however, is among the ancient yews and hollies which surround the bowling green, and which are said to be among the finest, if not the oldest, in East Lothian. About two dozen of them have been upset, leaving an ugly gap; but, as the trees are not much injured by their fall, it is proposed to set the best of them up again, which will in a great measure restore one of the most interesting features of these magnificent remains of feudal ages.

S.

LEICESTERSHIRE.—Belvoir Castle.—The great storm of Oct. 14th passed over this estate, with disastrous effect on trees, &c., especially where the woods and plantations are exposed to the prevailing westerly winds of this district. I well remember other violent storms, but in this instance it blew a perfect hurricane, and in apparently circular gusts, not only uprooting or snapping off the thick boles of sturdy trees, but twisting off the tops or partly denuding the head and spreading the breakage in every direction. Poplars were the special object of the fantastic twist. Two plantations of about eighty years' growth, lately thinned, are nearly annihilated. The first sign of a storm commenced on Thursday night with a strong north-west wind, and finally attained its height about eleven o'clock on Friday. Many fine trees were thrown across the public and other roads, requiring the hasty attention of every available hand. In one case a large elm fell upon a cottage, breaking down the roof and walls; an old man just leaving his bed narrowly escaped being killed. Many park and hedgerow trees had to yield to the fury of the wind, some uprooted and others irrecoverably damaged. It is noteworthy that the sycamore (*Pseudo platanus*) in outstanding exposure remains intact, probably owing to the partial fall of the leaves. I am not in a position to give even an

approximate value of the destruction on this extensive estate. The following summary will show the number of trees uprooted or ruinously damaged. No account is taken of the numerous thorn bushes, distributed far and near:—

Oak	319	Brought forward	1,164
Spruce	165	Scotch fir	6
Larch	266	Mountain ash	1
Elm	162	Bird cherry	1
Ash	124	Poplar	15
Spanish chestnut	70	Birch... ..	16
Cherry	6	Acacia	1
Lime	13	Walnut	1
Silver fir	2	Turkey oak	2
Sycamore poles	18	Various	33
Beech	19	Maple	1
	1,164	Horse chestnut	1
		Total	1,242

J. PARKER.

LONDONDERRY.—*Ballykelly*.—Your letter requesting particulars of the gale of the 14th of October arrived in my absence from home; I therefore could not reply sooner. The gale struck this locality about half-past nine in the morning, and in the remembrance of the oldest inhabitant there has been nothing like it here for fifty years. We had thirty trees blown down, Scotch fir and larch, from twenty-eight to thirty-five years of age. There are a great many of the oaks sadly broken in the branches, but, with the exception of four, they will all get over it. We had no hardwood trees blown up by the roots. Some of the farm-steadings that were exposed have suffered a great deal. One house exposed to the full fury of the gale, and having a zinc roof, had it lifted completely off, and blown over a 12 ft. wall. I do not hear of any trees of note being blown down in this locality. The gale blew from the north-east.—W. NAPIER.

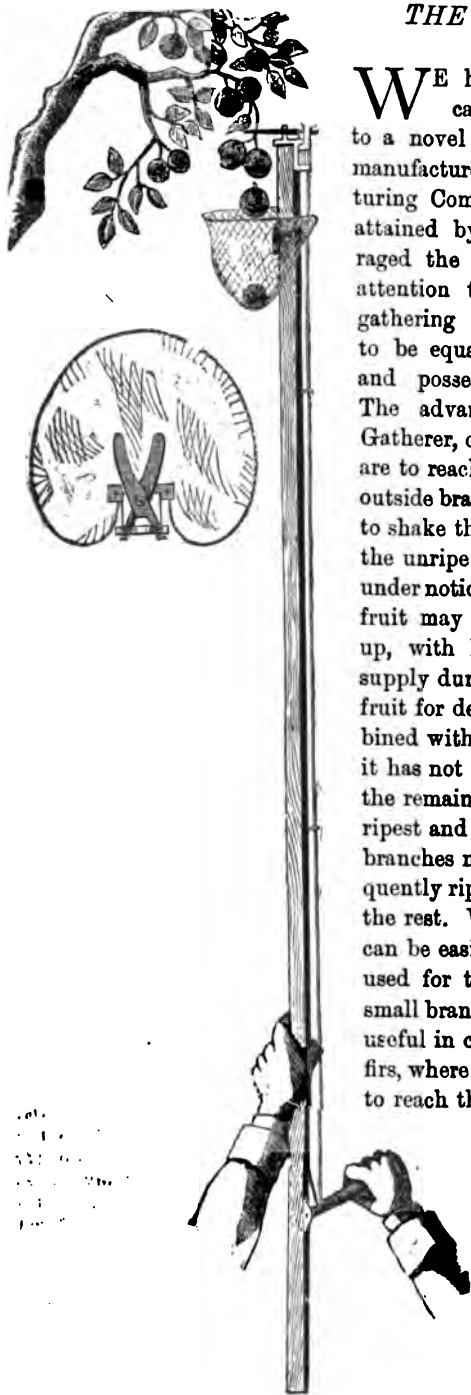
SOMERSETSHIRE—*Taunton*.—In the *Journal of Forestry* for November I see in the reports of the storm of October 14th no report from Somerset. As it may interest your readers, I give a report of the damage done here. I enclose the exact measurement of two English elms, and a rough measurement of a third: first elm, 532 ft. cube under bark; limbs broken, 45 ft. cube as firewood; total, 577 ft.; length when fell, 98 ft. Second elm, 487 ft. 6 in. cube under bark; limbs broken, 22 ft. cube as firewood; total, 509 ft. 6 in. cube; length when fell, 103 ft. Third elm, about 280 ft. Total fell, 11 elms, 2 oaks, 2 larch, 2 poplars; also 1 large elm topped at about 40 ft. up, and a great many branches broken, which has completely spoiled the appearance of some of our fine old trees. I may state that the elms I give you the measurement of are supposed to be 300 years old, or thereabouts.—M. FARDOR.

SUSSEX.—*St. Leonard's Forest*.—I regret that absence from home at the time of the gale on the 14th ult. (having been then in Scotland) prevented my giving you the information you wished for as to its effects in my neighbourhood. On my estate (St. Leonard's Forest, Sussex) I suffered severely in the loss of trees, especially where exposed to the east. The majority of those blown down were larch and pine, those most damaged Spanish chestnut and birch: the beech suffered but little, and the oaks less than in the gale of October, 1880. My woodreeve considers the recent storm the heaviest that he remembers in that neighbourhood since that of (?) November, 1837. I have not estimated the amount of damage, but my forest having chiefly a southerly and westerly aspect, it has not been so great as in plantations on eastern slopes. Several of the large elms around Horsham have suffered in the same way as those in Kensington Gardens.—WM. ALDRIDGE.

THE STANDARD FRUIT GATHERER.

WE have on a previous occasion called the attention of our readers to a novel and very useful tree pruner, manufactured by the Standard Manufacturing Company, of Derby. The success attained by this instrument has encouraged the manufacturers to direct their attention to the production of a fruit-gathering implement which they claim to be equally as effective and practical, and possessing similar characteristics. The advantages of the Standard Fruit Gatherer, of which we give an illustration, are to reach ripe fruit growing on light and outside branches without a ladder, or having to shake the tree, thereby bringing down the unripe fruit as well. The instrument under notice removes this difficulty, as the fruit may be secured as it ripens, keeping up, with little trouble, an uninterrupted supply during the season of the choicest fruit for dessert or cooking purposes, combined with the satisfaction of knowing that it has not been by the sacrifice or waste of the remainder. Experience teaches that the ripest and best fruit is to be found on the branches most exposed to the sun, and frequently ripe enough to gather long before the rest. When required the net appliance can be easily removed, and the implement used for trimming and pruning vines and small branches. It may also be found very useful in collecting the cones of pines and firs, where it is often difficult and dangerous to reach them with the hand.

The instrument appears to be carefully constructed, and is sold for 10s. 6d. with eight feet pole, and 11s. 6d. with ten feet pole.



TRADE CATALOGUES.

A PROPOS of the planting season, we have to acknowledge the receipt of copies of several carefully compiled catalogues from well-known firms. Messrs. James Backhouse & Son, York, forward their catalogue of forest and ornamental trees, coniferæ, &c., in which they mention their stock of larch as specially strong and fine. The old-established firm of Messrs. Dicksons & Co., 1, Waterloo Place, Edinburgh, "forest and ornamental trees, coniferæ, rhododendrons, &c."; their forest trees should receive special attention, the fine situation of the nurseries rendering the trees strong and healthy. Messrs. G. J. Alberts & Co., well-known nurserymen, of Boskoop, Holland, send an English printed catalogue of their specialties. Messrs. Ewing & Co., the Royal Norfolk Nurseries, Newmarket Road, Eaton, near Norwich, notify "liberal discounts through the discontinuing of business here, and purpose selling off stock immediately." Messrs. Wood & Ingram, The Nurseries, Huntingdon, send a well-got-up and complete list of their nursery stock. Ornamental trees and shrubs are in fine condition for removal, it is stated. Messrs. Thomas Kennedy & Co., Dumfries, possess nurseries in one of the best districts in Great Britain for rearing young trees. Their catalogue will be found a valuable one. Messrs. Ormiston & Renwick, Melrose, Roxburghshire, state that forest trees receive a large share of their attention. Messrs. Osborn & Sons, the old firm at Fulham, Sunbury, and Hampton, send a supplementary catalogue of hardy trees, coniferæ, &c. Among their novelties a fine variegated ivy obtained a first-class certificate of merit at the Exhibition of the Royal Horticultural Society, in July, 1880, at the Botanic Society's Exhibition in May last, and at the Exhibition of the Manchester Botanical and Horticultural Society

in August. It was described as "the most charming plant in last exhibition." Messrs. Francis and Arthur Dickson & Sons, the Upton Nurseries, Chester, send a very complete catalogue of forest trees, &c. Their nurseries, "200 acres in extent, and very bleak and exposed," would render some hardy plants and trees for intending purchasers.

We have to add Messrs. Little & Ballantyne's (Carlisle) new price list of forest trees, &c., just received. Their nursery grounds are 130 acres in extent, and the excellence of their stock is well-known. A table for planters, showing the number of trees required for imperial, Scotch, and Irish acres, is added to the catalogue.

FOREST CONSERVATION
IN AUSTRALASIA.

CONSIDERABLE attention is being paid to the subject of forest destruction in the Australasian colonies, which is one of paramount importance, not only as regards the supply of timber, but as affecting very materially the rainfall and water supply.

In New Zealand the Kauri pine is being fast exterminated, and Dr. Hector has pointed out that the average annual destruction of the New Zealand forests during the thirty-eight years terminating in 1868 was at the rate of 23 per cent., while in the succeeding five years 20 per cent. in addition was destroyed of what remained, being at the rate per province as follows:—Auckland, 27; Taranaki, 11; Wellington, 25; Hawkes Bay, 30; Nelson, 20; Canterbury, 33; Otago, 10; Marlborough, 28. In Victoria, New South Wales, and South Australia the evils arising from reckless and wholesale deforestations are beginning to make themselves felt in increased dryness of climate, longer droughts, and more numerous bush fires.

A proposal has been made in South Australia by Mr. Goyder, the

Surveyor-General of the colony, to carry out a systematic course of tree-planting, by reserving a block of 200,000 acres, and spending on it £14,000 during the first year, and £10,500 during each of the following eleven, thus making the expenditure £130,000 by the time that the whole 200,000 acres were properly fenced in and planted. During the first five years there would not be any revenue, but in the succeeding years the returns

from periodical thinnings might be estimated at £35,000 per annum, until the end of the twenty-first year, when the colony would be in possession of 200,000 acres, or 310 square miles, of forest. This scheme may probably be modified by having smaller areas and more of them, dispersed in different localities, which would exert a more beneficial influence on the climate and rainfall of the interior.



MEASUREMENT OF TREES.—In our report last month of Mr. J. W. Barry's interesting paper on this subject, read before the last meeting of the Scottish Arboricultural Society, the following *errata* occurred:—p. 483, for "Mr. Goursand" read "Mr. Goursaud," and in next line for "Meyviat" read "Meyriat." In heading of table—Diameter of butt end, &c., for "tapes" read "taper."

SILVER BEECH.—The attempt to grow silver beech in Langworthy Road, Pendleton, near Manchester, is likely to prove a failure. Of those forty-eight trees, a number of which were replaced in the early spring, one-fourth are quite dead, and many of the others are very sickly and must follow. None of them are very healthy-looking.

"THE FLORIST AND POMOLOGIST."—The October part of this magazine contains two coloured plates, in addition to the literary matter, a group of "New Bothwell Heaths," a family of neglected plants, and samples of the "Stirling Castle Apple," finest early kitchen fruit. The general contents are up to the average, "Vines and Vine Culture" being continued, and articles on the "Sea Eagle Peach," "New Carnations," and "Asparagus," forming part.

THE LARGEST TREE.—The biggest tree in the world is not in California, as every one supposed, but in Australia. The champion of the Yosemite Valley must give way to the peppermint trees on the Dandenong range of hills in

Australia. Baron Von Muller, who is a great authority on botanical subjects, asserts that he has seen one of the trees of the enormous height of 480 ft., almost equalling the height of St. Paul's Cathedral.—*Land and Water.*

A "RESURRECTIONED" TREE.—It is stated by a correspondent of the *Times* that a few years ago a great elm was blown down with a large ball of earth to its roots at Little Houghton, Northamptonshire. Men were set to work to remove it, but when they had sawn off the great limbs, to their astonishment, and almost terror, the trunk rose up of its own accord, and went back to its original place, and there it stands to this day. It is throwing out a fresh head, and is pointed out as a curious case of resurrection.

THE LARGEST ORCHARD IN THE WORLD.—American papers state that an orchard belonging to Mr. Kinstry, and situated on the banks of the Hudson, contains 24,000 apple-trees, 4,000 cherry-trees, 1,600 pear-trees, 500 peach-trees, 500 chestnut-trees, 200 plum-trees, 15,000 grape-vines, and 6,000 raspberry-trees. Mr. Kinstry's fruit garden is said, in fact, to be the largest in the world. Of apples alone he sold last year upwards of 30,000 barrels, and a proportionate quantity of the other kinds of fruit.—*Land and Water.*

A SLEEPING TREE.—A tree was recently brought from Australia to Nevada,

which has been in the habit at night of going to roost like the chickens. The leaves fold together, and the ends of the tender twigs coil themselves up like the tail of a well-conditioned pig. After one of the twigs has been stroked or handled, the leaves move uneasily, and are in a sort of mild commotion for a minute or more. Indignant at having been transplanted the other day, it had hardly been placed in its new quarters before the leaves began to stand up like the hair on the tail of an angry cat, and soon the whole plant was in a quiver.—*American Paper*.

TREE PLANTING.—In his Forestry Report to the Pennsylvania Board of Agriculture, Mr. Mehan says that it is a mere waste of public money to give premiums for the planting of trees anywhere and everywhere. His reason possibly is that so few of the trees, so planted scatteringly, can ever become fit for the saw and plane. Of all the beauty of high culture for which England is famous, not the least is the lushy umbrageousness and thrift of the artificial plantations seen on some of the hills, which, outside of the enclosures, are as bare as any prairie.—*Albany Country Gentleman*.

THE ELM BLIGHT.—A correspondent writes to us:—"One of the trees most affected by the elm blight in Eccles Old Road has been blown down by the wind. The bole snapped off about 14 ft. from the ground, where it would be fully 25 ft. in diameter. The exterior of the trunk appeared quite healthy, and except for the blight on the upper branches there was nothing to indicate decay; but the interior was quite rotten, and so soft that I could easily stick my finger into it about the core. Nearer the outside it was dark and less decayed, and for about an inch and a half all round under the bark it was quite sound and healthy."—*Manchester Guardian*.

PINUS REFLEXA.—Mr. Lemmon, in a note to the *Arizona Journal*, says:—"This large and valuable pine tree, until lately, was considered a variety of a certain white pine found on the Sierra Madre Mountains, Mexico, but of late declared by the highest authority (Dr. Engelmann) to be a distinct species. This pine resembles the common sugar pine of California, but the cones are not half so long, and even when young the scales are strongly reflected, suggesting the doctor's new name for the species,

Pinus reflexa. It is frequently met with in the deer park referred to, also on a similar plateau on Mount Graham, and is reported also from several other ranges."—*Garden*.

TREE DWELLERS.—A French naval doctor, M. Crevaux, has lately made important explorations in the northern parts of South America, more especially in the valley of the Orinoco and its affluents. Among other facts of observation he states that the Guaraunos, at the delta of that river, take refuge in the trees when the delta is inundated. There they make a sort of dwelling with branches and clay. The women light, on a small piece of floor, the fire needed for cooking, and the traveller on the river by night often sees with surprise long rows of flames at a considerable height in the air. The Guaraunos dispose of their dead by hanging them in hammocks in the tops of trees.—*Public Opinion*.

SPONTANEOUS FORESTS.—A writer in a West Virginia paper combats the opinion, held by many arboriculturists, that an open country is never converted into a forest through the operation of natural causes, and, as establishing the fact that such change does sometimes occur, brings forward the case of the Shenandoah Valley. When first settled, about 160 years ago, it was an open prairie-like region, covered with tall grass, on which fed herds of deer, buffalo, elk, &c., and having no timber, except on ridgy portions of it, but in consequence of its settlement the annual fires were prevented, and trees sprang up almost as thickly and regularly as if seed had been planted. These forests, having been preserved by the farmers, cover now a large part of the surface with hard wood trees of superior excellence. These facts would also seem to substantiate the theory that the treeless character of the prairies of the West is due to the annual burning of the grass by the Indians.

A BIG TREE.—A gigantic tree has been chopped down that was probably the oldest and largest in Kentucky, says an American paper. It measures 18 ft. in diameter at the root base. The cut was made 6 ft. above the ground, where its diameter was at least 12 ft., and its circumference 36 or 37 ft. From the cut to the first limb can be made eight good length rail cuts, each 10 ft. long, which would split enough

rails to fence a small farm. The first limb was nearly a half-dozen feet in diameter, and it would have, by itself, made a very large saw-log. Nearly all the small limbs had fallen and decayed away. Its plank measurement is computed at nearly 50,000 ft., besides several limbs that would make altogether 25 cords of wood. It is supposed that this mighty forester was four or five centuries old. There were to be distinctly seen over 300 rings, and it is not known how long since it completed its growth, as it has been dead for many years.

A LARGE WILLOW.—Mr. E. Hobday, writing in the *Garden* respecting Haverholme Priory, says:—"On the north side, outside the walls, is rather a pretty grass-plot, with a pleasant outlook, bounded by a low yew hedge, and a flower border called Lady Evaline's garden. And a little further on in the park, within 100 yards of Haverholme Wood, is one of the finest, if not the largest, willows in the country. At one foot from the ground it measures 27 ft. 4 in. round; at four feet it is 20 ft. 5 in.; but at seven feet, owing to the protuberance at the base of the limbs, it is 28 ft. in circumference. About eight feet from the ground it breaks into eight large limbs, each equal to an ordinary sized tree. The spread of branches is on one side 40 ft. and 28 ft. on the other, and the tree, which is of the Huntingdon species, is about 40 ft. high. It is perfectly sound in body and limb, and quite healthy, though its age is given as 1,000 years. It stands on a slight elevation, very like the bank of a forked river; indeed, one can easily trace an indentation in the surface, probably the ancient bed of the river Slea."

NATIVE TREES AND SHRUBS FOR COLOUR.—We are rather prone to assume that for fine colour in trees one must go to North America. No doubt the colour is very fine there, but we think that it is owing to the predominance in great quantity of certain trees that colour well that gives American foliage its character in autumn. Among the native shrubs that we have ourselves seen colour splendidly, but which are seldom recognised as having any beauty of that kind, is the common Guelder rose and also the spindle tree, both of which we have seen splendid as regards the colour of the foliage. When we ascend to larger trees perhaps the most

lovely in colour, and above all in variety of colour, is the beech. In Epping Forest lately, within a hundred yards, we have seen from 15 to 18 shades of red in the beech trees, some of them most delicate and approaching to salmon colour. We do not speak of the yellows. The elm is sometimes golden, but this depends on season and is sometimes of short-lived beauty, but the beech is always good and lasts. We question if any American tree is so good.—*Field*.

THE LATE MR. ALEXANDER MACRAE.—We have to record the death of Mr. Alexander MacRae, head forester at the Lews Castle grounds. He was born at Brahan, Ross-shire, in 1794, and beginning work at an early age in the garden at Brahan Castle, he continued there until the year 1830, when he came to the Lews as a gardener to the Seaforth family. When the sale of the Lews estate was made by the Seaforth's trustees to the late Sir James Matheson, Baronet, in 1843, it was arranged that Mr. MacRae should continue in the service of the new proprietor, by whom and Lady Matheson he was much trusted. Under Lady Matheson's and his superintendence the principal part, if not the whole, of the Lews Castle grounds and policies was opened up with labyrinthian walks, and laid out and planted with trees and shrubs.

A GIANT ELM.—Amongst the historic trees laid low by the storm of October 14 was an immense twin tree, which stood in the grounds of Silver Hall, Isleworth, and near to the Thames. This big fellow had two stems starting from one base, and these had close to the ground a diameter of 13 ft. 7 in. At 3 ft. from the ground the girth of the largest stem was 20 ft. 4 in., and that of the smaller one 14 ft. 6 in. To show that this bulk was continuous proportionately, the measurement of the larger stem at 30 ft. high was 14 ft. 4 in., whilst the smaller one at 39 ft. from the ground was quite hollow, and had an internal diameter of 3 ft. 8 in. The tree was 120 ft. in height, and must have been of great age. Mr. Glossop, the present tenant of Silver Hall, mentions that he has known the tree for forty years, and during all that time it had been in a state of decadence. It is believed that Brinsley Sheridan formerly lived in the house, and alluded to the tree in a letter to Horace Walpole.—*Gardener's Chronicle*.

THE JOURNAL OF FORESTRY & ESTATE MANAGEMENT.

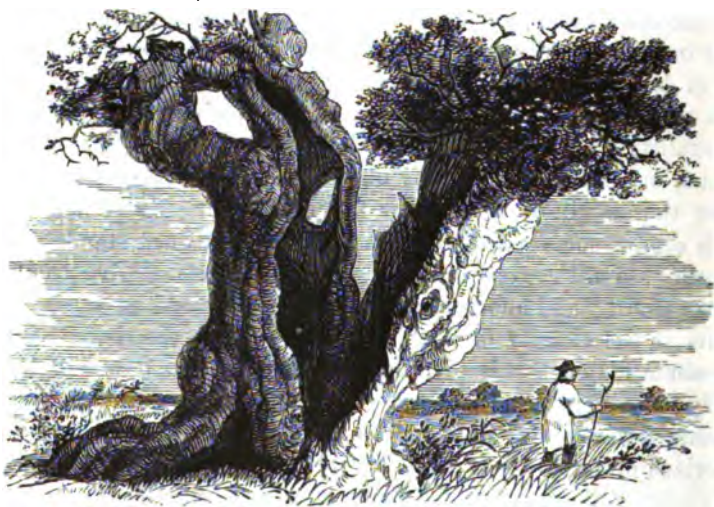
THE FOREST AND CHACE OF MALVERN.

(Concluded from page 554.)

THE Wych Elm (*Ulmus montana*) is an undoubted indigenous tree partial to upland ground, where if unmolested its branches spread far out and depend very gracefully; but in general it comes under the woodman's axe to stand as a debased pollard, and thus treated its head in time assumes enormous proportions on the top of a bole much less in bulk, and often makes a very grotesque appearance. Two of such monstrosities existing at Cradley are depicted in the Woolhope Naturalists' Club Transactions for 1868, and others almost as strange-looking may be noticed by any observer in the course of his rambles about the margin of woods near the base of the Malvern chain. A wych elm of some size and great age, though dwarf, stands near the eastern base of the Keysend Hill, near the carriage-drive to Bromsberrow Court; and another curious hollow tree of the same species occurs in the vicinity of Knightsford Bridge, on the river Teme. A representation of this is given on the next page, and as will be seen the sylvan veteran makes a picturesque object.

Some difference of opinion has been expressed by botanists and historians of forest trees as to the claims of the Lime or Linden to nativity in Britain, but in the shape of *Tilia parvifolia* it occurs in so many woods and coppices in the Malvern country eastward of the hills, that its claims as a native tree appear to be indisputable, though none of any great size can be noted in woods. But the lime is there mostly cut down as coppice-wood, and few trees of any great age are suffered to stand. I have observed the lime abundantly in woods at the Berrow, in a wood at the eastern base of the Herefordshire Beacon, in High Grove, Mathon, in a wood on the Little Storage, at Rosebury Rock, &c. By the side of Leigh Brook it forms bushes to some extent, and in woods and coppices about Leigh the lime appears with the characters of *Tilia Europæa*. In the parish of Bromsberrow is a fine specimen of *T. parvifolia*, standing where some roads meet near Brownsend, and this is called "the Brownsend Lime," but it has been planted, evidently. Some very fine trees of *Tilia Europæa* now stand in a field about half a mile south of Bromsberrow Church, and by the side of

the road leading from Ledbury towards Gloucester. Two of these, growing near each other, have become conjoined, both by the amalgamation of their arms and by a lateral junction at the root. The largest of these trees is 27 ft. in circumference at three feet from the ground, and is 36 ft. round the base; the other is 11 ft. 3 in. in girth at a yard from the ground, and 19 ft. in circumference at the base. The whole mass if measured as one tree (and the interval between the boles where the connecting root joins them is only 19 in.) is full 48 ft. in circumference. These measurements were made in 1839. The woodcut on p. 619 gives the appearance of this didymous tree when divested of its foliage. When these trees were planted I have been unable to ascertain. The Brownsend Lime is 18 ft. in girth, three feet from the ground.



HOLLOW WYCH ELM (*Ulmus montana*), NEAR KNIGHTSFORD BRIDGE.

In a field on the Priory Farm, Little Malvern, are several large trees of *Tilia grandifolia*, but these do not belong exactly to forest times, having certainly been planted either by one of the priors of Little Malvern, or some of his lay successors to the priory lands. The flowers of this species are larger and sweeter in scent than the common kind, and the pallid bracts are more evident. The leaves are not larger than those of *T. Europæa*, but they are downy beneath, and the tree better deserves the trivial name of *grandiflora*, from its larger and more odorous flowers, fully realizing the poetical idea that

“A murmur of the bee
Dwells ever in the honey’d lime above.”—MRS. HEMANS.

The Maple (*Acer campestre*) is a very common tree on the borders

of woods and coppices about the Chace, as well as in old hedgerows, and though pollarded too frequently by the farmer, yet, as it is but seldom entirely cut down, it maintains a long life, though often putting on a stunted or grotesque appearance. It is a slow-growing tree, and it is rare to find any of considerable bulk, though some trees standing singly that I have met with must be above 500 years old. The only tree about Hanley that can be certainly referred to the time when the Beauchamps possessed Hanley Castle is a maple. But the largest veteran of this species that I have met with stands in a field at Powick, not far from the Teme, and exhibits a very old, decayed, and hollow bole, from which a younger one proceeds, itself of considerable size, and spreading much beyond its parent. The girth of the combined boles near the base exceeds 14 ft., which is greater than has been



INOSCULATED LIMES (*Tilia Europæa*), STANDING IN A FIELD
IN THE PARISH OF BROMSBERROW.

before recorded of any English maple. This curious old tree is represented in the woodcut on the following page. Others may be remarked of greater spread of bough, but not equal in antiquity to this tree, the oldest portion of which probably reaches to 700 years.

Another slow-growing and long-enduring tree, still occurring sparsely in almost every wood in and around the Chace, is the Service-tree (*Pyrus torminalis*), which, however, seldom attains any large size, and presents a beautiful aspect when in flower. It mostly gets cut down within woods, but at Bush Hill, Powick, in Black Hawthorn Lane leading to Madresfield, and a few other neglected spots, some good-sized trees occur that show both flowers and the well-known brown fruit, which requires to be kept a considerable

time before it is eaten. Within "My lord's wood," situated in the parish of Powick, and not far from Bransford Court, so called from its being the wood of the manor devoted specially to the lord's use, and so existing as a wood from the very earliest period to which thought can revert, are some tall individuals of the service-tree, the tallest and oldest that I know of in Worcestershire. The age of these trees can only be guessed at while standing, but the service-tree grows at so slow a rate, and these have been so long protected within the wood, that it would not be unreasonable to refer their date to as early as the reign of Edward I.

The Ash (*Fraxinus excelsior*) is a widely-distributed tree, and by the side of brooks often puts on a scraggy appearance, decrepit with age, and batteration by tempest, more especially if perforated and



OLD HOLLOW DIDYMOUS MAPLE (*Acer campestre*), IN A FIELD
NEAR THE TEME AT POWICK.

reduced to rottenness by the attacks of the monstrous caterpillar of the goat moth. But scarcely any tree has a more majestic appearance or extends its boughs wider than the ash when left to grow with sufficient space and undisputed sovereignty. A splendid tree that grew in the grounds at Hope End, near Ledbury, is mentioned by Barret in his account of the Malvern Hills, published in the early part of the present century, and when I measured it some years ago it was nearly 40 ft. round the base close to the ground. Some enemy of the Dryads has caused this beautiful ash to be felled. One almost as large, though not so regular and widely-spreading, I have noticed in a field near Cork's Hill, Forthampton, on the estate of Joseph

Yorke, Esq., and I trust that it still exists. Though Forthampton is out of the exact bounds of Malvern Chace, yet it may be said to be in the Malvern country, as the Hanley Castle people had right of common there in the forest times, and the dimensions of this large ash tree are worth recording. Close to the ground where the roots spread out it was nearly 36 ft. round, and at three feet from the base the bole was 22 ft. 2 in. in girth. The radius of the longest arm was 36 ft., and its height was 91 ft. I know of no other ash so large as this. In Eldersfield churchyard are some monstrous pollard ashes, one of which is above 30 ft. round its swollen base, and 15 ft. in girth at three feet from the ground. The ash is sometimes didymous or double, and I noticed one at Forthampton 2 ft. between the twin boles; but they often grow nearer than this, and when by an inosculation an opening or needle-like eye is formed, making a hole through which a person may squeeze, there is a rustic superstition that if married women who have not hitherto rejoiced in a progeny are anxious for a young olive-branch springing up in their households their wishes will be gratified after pushing through this orifice in the rifted ash. I only record this as an "old saying," which, however, seems to have descended from Druidical times, and I know a lady who at any rate, if she did not benefit *by the process*, had her wishes gratified *after* making the experiment.

The Alder (*Alnus glutinosa*) must of necessity be noticed, as its prevalence in the district is stated by all authors to have given rise to the name of Malvern, *Moel*, or *Mol* being Celtic for a bare mountain, and *wern* the Celtic appellation for the alder tree. Even now every stream that flows from the hills towards the Severn is bordered by alder bushes, and the coppices at the base of the hills, until the recent spread of villas and houses around Great Malvern, were crowded with alders. This tree, being too often lopped like the willow, becomes mostly dwarfed and distorted, so that alders of any altitude or spread of bough are of rare occurrence, though as it is an enduring tree, and will bear any hacking, and decays but slowly, the old stumps that remain by brook-sides, on which many a patient angler takes his stand, must be of great age and belong to forest times. But if allowed to grow unmolested the alder becomes a handsome tree, and rises to a considerable height. I have observed a very large didymous alder near Powick, the two boles joining near the base and becoming hollow, but they divide above at a considerable angle, forming a very remarkable tree that I should estimate at 600 years old, and possibly a greater age, for an alder will last as long as any oak. The combined boles of this tree exceed 17 ft. in girth, which is larger than any alder whose size is recorded by British dendrologists.

Willows must have been at all times a characteristic feature, shadowing the streams that intersect the Chace, but especially remarkable as bordering the river Teme, its northern boundary, where they are very plentiful. The White Willow (*Salix alba*) is the most abundant tree of this genus, but from its fragile nature there are none of any great age, as they are so easily upset by winds and storms, and very soon decay and become hollow. By the Teme-side and along Leigh Brook the most singular and grotesque shapes appear. Where these have been pollarded their heads assume monstrous forms, and become receptacles for numerous epiphytes. Hollow willows are sometimes preserved and renewed by a root being dropped from above down the cavity from the pollarded head, which, reaching the ground, forms a fulcrum for the old tree, and new branches are developed from this



CONJOINED WILLOWS (*Salix alba*), IN A FIELD NEAR
BRANSFORD BRIDGE.

scion, which becomes at last a fresh growth when the old shell entirely decays and breaks up. Such singular dendroidal forms, dead, hollow, and distorted below, yet throwing out from their broken and shapeless tops above an array of living shoots with fresh green leaves, recalls the vivid description of an old English poet as to an aged moribund tree that was

“ Dry and dead,
Still clad with reliques of its trophies old,
Lifting to heaven its aged, hoary head,
Whose foot on earth hath got but feeble hold,
And half disbowell'd stands above the ground.”

One of the largest willows that I have noted has its hollow bole

split into two parts, and is 16 ft. 6 in. girth, with many young shoots from the top. This stands by Laughern Brook, but how old there are no data to determine.

In a field near Bransford Bridge there is a very curious case of two willows having become inosculated, and their arms thus united presented a very curious appearance at the time the sketch was taken represented in the cut opposite. But willows, more than any other tree, are so hacked and despoiled year after year that they are always changing their appearance, while boisterous winds upset them, often giving the rustic the advantage of a temporary bridge across a brook, and presenting a picturesque sketch to the artist—

“Where leans the mossy willow half-way o’er,
On which the shepherd crawls astride to throw
His angle, clear of weeds and vagrant flags
That crowd the water’s brim.”—CLARE.

Such instances come in the way of the wanderer at every excursion. It is more curious, perhaps, to perceive the seedling trees that often get upon an old pollarded willow, and dispute vitality with it, at last if not inducing its destruction finally taking up the place it occupied, if the roots of the intruder can only reach the soil. Seedling hawthorns, yews, sycamores, oaks, and various frutescent plants often get upon the decaying head of a pollard willow, combining their foliage with that of the grey willow with an odd effect, and so deceiving the eye at a little distance. I have noticed a large *Rhamnus catharticus* growing on a willow near Powick, and an oak of some size mounted on a willow at Bransford, that was evidently breaking up the hollow tree within which it had rooted. Willows of large size are rare, and I have not found one whose girth exceeded 17 ft. A fine vigorous *Salix alba* now stands near the Severn below Upton Bridge, of considerable size, and may attain large dimensions if left untouched in years to come.

The Hawthorn (*Crataegus oxyacantha*), in its natural form as a closely-branched tree of no great height, affects the sides of hills or open heathy places, and in age the old bole often becomes divided at the base. The only part of the Malvern Hills where the hawthorn has established itself to any extent is in the hollow above the Holy Well, where the declivity is whitened in early summer by the fragrant blossoms of “the milk-white thorn that scents the evening gale,” very prettily. Some stunted entangled hawthorns here overgrown with the dingy purple stems of the *Jungermannia tamarisci*, as well as mosses and hoary lichens, must be of great age—perhaps six or seven hundred years—but I can only speak with certainty of the section of one hawthorn trunk that I saw, where I numbered more than 300

rings of annual growth, and the greater number were of larger dimensions than this one. In the space at the junction of the road from Madresfield to Powick, at the end of "Black Hawthorn Lane," there stood formerly a hawthorn of considerable size and age, for the bole was 9 ft. in girth—very large dimensions for a hawthorn. This memorial tree has been felled, which it need not have been, and a young oak has been planted in its place. On the hill between the old Powick bridge and Worcester there stood within memory an aged thorn called "Prince Robin's Tree," it being stated and believed that at one of the first skirmishes in the Civil Wars of Charles I.'s reign Prince Rupert was stationed at or under this tree when he directed the charge that routed the Parliamentary cavalry, and forced their immediate retreat and flight. This thorn must have been of great age, for it finally rotted away, and no remains of it now appear upon the spot, but another planted hawthorn marks the site.

There is a fine thorn of considerable size on the estate of W. Willis-Bund, Esq., at Upper Wick, not far from the river Teme at Powick, and this tree I have understood is mentioned as a boundary tree in writings of the property more than 200 years old. It was then a considerable-sized tree, and may now be estimated as probably numbering more than 600 years. In the vicinity of Knightsford Bridge, on the Teme, is a curious instance of the anastomization of a maple and hawthorn, both of considerable size, and forming a combined mass of foliage.

Formerly there were various "holy thorns" about the country, a variety of the hawthorn that bloomed about Christmas, and was popularly said to open its blossoms only on old Christmas Eve. Most of these holy thorns have disappeared, but one existed till a late period at Redmarley Farm, near Acton Beauchamp, some five or six miles north of Great Malvern, and this is said to have been the resort of hosts of country people on Christmas Eve more than a quarter of a century ago. The spiteful occupant of the farm at last cut the tree down, being annoyed by the visits of so many curious persons, who, coming from various distances, taxed his cider barrel more than his churlish spirit approved. All these Christmas flowering thorns were said to be scions from the original tree, presumed to have been planted by St. Joseph of Arimathea, at Glastonbury, after his landing from Palestine.

The Mountain Ash (*Pyrus aucuparia*) is a native tree, but there is but a very scanty sprinkling of it in the copses of the Chace, though it abounds more in the western woods, as in High Grove, Mathon. This tree presents beautiful masses of corymbose flowers in May, but never

attains any great size or extraordinary age. The largest recorded in this district is mentioned in Nash's Worcestershire as growing in the grounds at Severn End, in Hanley Castle parish. The dimensions of this tree are stated by Nash as "8 ft. high to the boughs, and the circumference of the body at the height of 8 ft. from the ground 8 ft. 10 in., the height of the tree is about 43 ft. Another of nearly equal size may be seen in the plantations of John Martin, Esq., of Ham Court, near Upton-upon-Severn." The mountain ash has been much planted about Malvern, and on the declivities above Malvern Wells.

Another tree to be seen scattered generally singly in woods is the Birch (*Betula alba*), distinguished by its slender dependent branches and smooth silvery bark, which, however, becomes rugged and riven in age. I can refer to no very large ones, but near Acton Beauchamp I have observed a grove consisting entirely of birches, some of which exhibited a rugged bark, denoting an age going back several hundred years. At any rate this is an aboriginal grove, and as such may have existed in prehistoric times. Several places take their designations from birches, as Birchin Grove, Birchin Hall, Birch Wood, &c. This tree occasionally becomes much deformed by nodules on its branches, which look like an assemblage of birds' nests, and a birch thus strangely distorted stands on the Berrow Hill, Martley. Many trees occur in woods of the Chace not quite so observable as this, probably arising from some obstruction in the circulation of the sap of the tree, or the attack of insects.

The common Wild Cherry (*Prunus avium*) is now found scattered in a bushy form in most of the woods in and about Malvern Chace, especially those of Mathon, Colwall, and Cradley, on the Silurian strata, and unquestionably to my knowledge the cherry has much increased of late years in woods where the coppice is periodically felled, so that its flowers in April form a well-marked adornment of the scene. If, as stated by Pliny, the cherry was not known in Italy until introduced by Lucullus, from Pontus, at the close of the Mithridatic war (B.C. 67), and was carried by the Romans into Britain, then this tree, now so widely dispersed, can only be considered as naturalized, and very probably the stones are distributed about the country by birds from gardens and orchards. That this is no fanciful idea is evident from the fact that a little coppice of cherry trees has been formed on the top of the battlements of Newland Church, Gloucestershire, where only birds could have deposited the stones from which they have sprung up. A similar fact has been remarked as to the appearance of the cherry in North America. M. le Cante has stated that, when beech woods are cut down there they are speedily replaced by cherry trees. He accounts for this

remarkable fact on the supposition that birds, who eat the fruit with avidity, may have resorted to the woods for shelter, and there dropped the stones, which either lay dormant, or germinated and remained in a diminutive state until the beeches were cut down, when they advanced rapidly, and finally became the principal occupants of the soil. Now if the cherry tree has thus become naturalized in America, into which its introduction in modern times is certain, there is just ground for the opinion that its extensive diffusion through Europe may be attributed to the same cause, and that the assertion of the older authors, that it is of Asiatic origin, is correct. Nevertheless, though increasing in woods as it now does, if cultivated by the Romans in Britain, the birds of those days would soon colonize it, and therefore its first introduction among our indigenous trees must have been many centuries ago. The cherry will attain a large size if unmolested in its place of growth, and I remember a very tall and fine tree that stood on the eminence above the quarry of Ludlow Rock, at the bottom of Purlieu Lane. The bole of this tree was about 10 ft. in girth, and, with its branches drooping from age, was truly an adornment of the scene. It was too beautiful to escape from the destroying axe, to which it succumbed some time after 1852, as it was then in existence.

The common Elm (*Ulmus campestris* or *suberosa*), though at present a prominent feature observable in the hedgerows of all the midland counties of England, is certainly an introduced tree, as is evident from its so seldom producing ripened seeds in this country, and it therefore spreads and is perpetuated by scions proceeding from the enduring roots. It seems probable that the Romans when established in Britain introduced this tree from Italy, and the common appellation, elm, appears to be derived from the Latin *Ulmus*. Whenever introduced, it has extended itself wonderfully in hedgerows, while during the early part of the last century it was most extensively planted in avenues. In many cases, also, the custom became common to plant an elm singly near farmhouses or in selected spots, and thus it is that solitary elms are now found scattered about in various places, old, bare, hollow, and scarred, justifying the language that Clare, the rural poet, has applied to a reverend tree of this sort—

“ Huge elm with rifted trunk all notch'd and scarr'd,
Like to a warrior's destiny.”

An old elm answering to this description stands close to a farmhouse on the road from Upton-on-Severn to Little Malvern, and about a mile and a half from the former town. This tree, swollen, hollow, and battered, forms a grand mass of foliage worthy the pencil of an artist as a picturesque object, though getting into a ruined state, yet.

sending its topmost branches high into air. It is hollow, and, as not unusual with old elms, swollen about the base, which adds to its apparent magnitude. It measures at a yard from the base nearly 30 ft. in circumference. Not far from this spot is a site traditionally called "the Palace," where was probably a hunting seat of one of the lords owning the Chace in old times. Elms have an early tendency to



THE FRIAR'S ELM (*Ulmus suberosa*), ON BARNARD'S GREEN, NEAR
GREAT MALVERN.

decay, and often look older than they really are, and when, as is frequently the case, swollen and wenny about their bases, or bleached where the bark has been stripped off, they become frightfully phantasmic objects.

The Barnard's Green or FRIAR'S ELM is an old, partially hollow, and very picturesque-looking tree, now standing on the side of the

common by the road from Great Malvern to the Rhydd and Upton. Its roots extend spoke-like some distance round the elm, which is swollen and tempest-battered, but it still presents a pictorial aspect, as the wood engraving on the previous page will render fully evident. It measures 45 ft. round the base, and 25 ft. in girth at three feet from the ground.

As this elm on Barnard's Green has been preserved with honour as a memorial if not a gospel tree, and is still honoured with an inscription placed among its branches, it is probable that, ancient as it looks, and battered and hollow as it is, it was planted as much as 300 years ago, for assuredly its appearance has been much the same for the last half-century, and perhaps for a whole one. This computation would take us to some time in the sixteenth century, before the disafforestation of the Chace. A few years since, as I have heard, a mandate went forth for the destruction of this ancient inhabitant of the common, but the Hama-Dryad of the tree influenced a neighbouring gentleman to contest the point, and a band of sylvans hurried to the rescue. By negotiation the sentence of death was reversed, and a treaty ratified, securing to the old elm its life interest in the green common it had so long shadowed, subject only to a quit-rent to the merciless winds. The elms are generally lopped too much in Worcestershire, so that they become tall and lanky, and often strangely swollen about their bases, while when the lopping process is too long continued they become black and distorted, like relics of a forest conflagration—

“ For huge fantastic forms, gnarl'd, old, and gray,
Assum'd the Heath-hag form in that dim scene.”

An elm of this description, of which I took a sketch some years ago, stood in a field at Powick, not far from the Teme, putting on the grotesque aspect depicted in the annexed woodcut. The lopping system induces to such appearances—bare, haggard, and monstrous. Once, however, planted in a hedge, the elm produces scions from the root, however it may be lopped and hacked, living on, though in a dwarf and deformed state. It used to be a favourite for avenues, but the fragrant flowers of the lime and its quicker growth render the latter more to be preferred as an avenue tree.

By brook-sides a few specimens of the indigenous Black Poplar (*Populus nigra*) may be met with here and there, similarly lopped, like the elm, and very scraggy-looking; but these old British poplars are gradually disappearing, and the Italian black poplar, now so much planted, takes their place, known by the masses of mistletoe that very soon load its branches, while no mistletoe ever appears on the indigenous poplars. This is a circumstance evident in a multitude of

places. Some very tall black poplars, where rooks have for many years made their congregated nests, stand on the western or right bank of the Severn, at the Upper and Lower Lodes, opposite to Tewkesbury, but these are planted trees, though of considerable age.

There are other trees and shrubs forming the underwood and bushes about the Chace, such as Dogwood (*Cornus sanguinea*), Hazel (*Corylus avellana*), Spindle-tree (*Euonymus Europæus*), Buckthorn (*Rhamnus catharticus*), Sloe (*Prunus spinosa*), Guelder-rose (*Viburnum lantana*



BATTERED POLLARD ELM (*Ulmus suberosa*), IN A FIELD AT POWICK, NEAR THE TEME.

and *opulus*), &c., but as none of these attain any great size, and are too often cut down to attain any extended age, detailed remarks are unnecessary. With respect to Ivy (*Hedera helix*), however, lowly as its growth generally appears, yet when it does get firm hold upon a tree, it assumes an arborescent trunk, which becomes almost as large as the tree about which the treacherous ivy has spread its snake-like arms. I have noticed trees which the ivy has completely invested and overpowered, making individuals that permitted its first advances

quite subsidiary to its own growth and spread of frondescence. An ash tree near Beauchamp's Court I have noticed as thus circumstanced, and the yew in Purlieu Lane, leading to Mathon, is so entwined to the very extremity of its branches that it has become almost as much an ivy tree as a yew. The ivy that invests the Ivy-scar Rock, on the North Hill, must from the name given to it have been there for centuries; while in still more secluded spots like the wood-invested Rosebury Rock by the Teme, near Knightsford Bridge, there are broad ivy stems that have quietly increased their huge bulk for many centuries, and may claim a very remote antiquity only to be guessed at.

There is, however, one domesticated tree, the Elder (*Sambucus nigra*), that deserves notice, as from some cause, dating from old times, it has been planted near almost every homestead in the country, and often in churchyards near the yew, and thus Shakespeare has alluded to it, and the somewhat unpleasant scent of its leaves—

“The stinking elder—grief.”

This allusion shows why it has got into churchyards, but its various medicinal properties caused it to be nourished near houses, for as Borlase says in his History of Cornwall, “the medicinal use of its several parts is extraordinary; its leaves, buds, blossoms, berries, pith, wood, and bark have more virtues than can possibly have room here without entering into too minute detail.” It must have been an early introduction into Britain, and some protective power appears to have been attached to it, which caused the elder to be generally planted in former times close to houses, and the custom is of high antiquity. That the elder is yet in some degree considered a safeguard to those who live near to its shade, or was so considered in not very remote times, appears from what a contributor to the *Athenæum* says, writing as late as 1846:—“The virtue of the elder tree in preserving men and cattle from witches is well known. In Devonshire farmers put a green twig of it in the staples of their stable doors, thus to keep out all unnatural intruders.” Whether in olden times there really was more demoniacal influence at work in the world than at present, or it was only imagined so, still it was generally believed that some malignant influence was ever ready to assail a man at every turn he took, and which could only be averted by some counteracting remedy. As plants and trees lay conveniently at hand, or could be made to grow at every one's threshold, they were called in to do the best they could against the enemy. It was perhaps well to be on the safe side, and if spiritual foes can really be kept at bay by a plant or a stick, it may be right to use the cudgels accordingly, or have them at hand for that purpose. As the elder has been so long the guardian of houses,

of course there are many fine flowering as well as old decayed trees dispersed over the country, and I have notes as to several old trees, but they never reach any remarkable bulk, though long enduring in a hollow and decaying state, and so surviving for centuries. Some remain that may be considered more than 500 years old, but these are all near houses, and it is very uncommon in woods, and conveyed there probably by birds, just as one has been thus planted on the tower of Castle Morton Church.

I have by no means enumerated all the old and curious dendroidal forms of battered and grotesque trees that might be found in secluded spots within the limits of the ancient Chace of Malvern, for the subject could not be easily exhausted in detail, and as years roll on other trees not at present very remarkable will be progressing into veterans for the study and examination of lovers of woodland scenery in years to come. Those I have recorded may then be compared with the dimensions now assigned them, or if they shall have passed away here will be their memorial. Change is ever progressing, and whatever may be thought of the ages of the past, notwithstanding the things that pseudo-interpreters of prophecy may say as to the day of doom, I consider that "this great globe and all that it inherit," or their successors, will not "dissolve" quite so soon as the writers alluded to have suggested, and that ages to come may be safely counted on when various objects now comparatively juvenile will have passed into the category of age. To our successors, then, the legacy of observation and record is bequeathed, to mark and set down what is curious in their day, as done here for their example.

[MR. EDWIN LEES, the author of "The Forest and Chace of Malvern," from whose book our account has been taken with his permission, informs us that all the trees here represented in the woodcuts remain standing, with the exception of the conjoined Willows at Bransford, and the battered pollard Elm that stood in a field at Powick, near the river Teme, which have been blown down or destroyed.—ED.]

THE PROTECTION OF RIVER BANKS.

ALTHOUGH a stream or river flowing through or bounding an estate generally adds to its amenity, yet they are often a source of anxiety to those in charge, as well as outlay to the owner, in keeping them within their banks and from washing away the land. When a river overflows its banks during floods, irreparable damage is often the result both to stock and crops; but owing to the expenditure necessary, particularly with large rivers, and other attendant difficulties in confining them to their regular course, the question

has become more of a public than a private one. No doubt in moderate-sized streams a small outlay would be sufficient in many instances to prevent an overflow; such as in the case of those having a sinuous course, it may be sometimes obviated by straightening the channel, thereby presenting a more direct outlet by which the water may pass away with greater velocity. Or, as occasionally happens, there may be a natural depression in the bank of a river, only a short distance in length, which during floods is the means of communicating the water of the stream to the adjoining lands. By raising such a depression with a bank properly formed to the requisite height, much damage may be prevented at small expense.

With mostly all streams and rivers there is a continual erosion of the banks going on whereby much valuable land is washed away, unless some remedy has been applied to prevent that taking place. In this instance it is not the floods that is the chief means of working away the natural banks, although sometimes such may be the case, as during a flood the course of the current may be altered by some obstruction lodged in its bed, thereby causing it to strike with greater force than hitherto at one particular point, so that a break may be caused whereby the regular current—which is the prime actor—works in and undermines the foot of the bank by its continuous action, and if it be of an open character it gradually crumples down, or if of a tenacious, nature slips take place and the whole disappears with the next flood. In protecting river banks it is therefore the insinuations of the regular current that should be prevented, and where that is done, the floods will do but little injury, if due precautions are taken with the higher portions of the banks.

Where a stream intersects an estate, although it may be working away the soil on one side or the other, it is not quite as necessary to have it prevented, as in the case of one that bounds a property, as in the former what is lost on the one side may be gained on the other, but in the latter, if not attended to in time, the area of either estate may be enlarged at the expense of its neighbour. It is, however, advisable in all cases to protect the banks where waste is taking or likely to take place, and the means to be adopted should be regulated by the nature of the stream and of the adjoining banks, as well as by the material that can conveniently be obtained for the protection of the same.

In shallow, rapid running streams, where the banks are of a moderate height, an excellent job may be effected by paving the foot of the bank with rough stone setts, sinking the first course well into the river bed, and continuing the stonework at least eighteen inches above the level of the regular currents, and giving it an inclination of

about 1 in 2; the remaining, that is the higher portion of the bank, may be sloped in unison with this, and sown down with seeds of some of the benty grasses, if there be a likely prospect of a sward being formed as the result, but if danger is apprehended, it should be faced up with grassy sods properly built, and, if necessary, pegged down, until they become knit together. With deeper currents the same method may be adopted if sufficient stones are convenient, but it will be necessary to drive a row of piles a short distance from, and along the front of the bank—such distance may be regulated by its height and the length intended for the slope, but if there be a sudden bend at the point where this operation is to take place, it would be expedient to give the stream an easier sweep by keeping the piles more into the river at the widest parts of the curve so as to lessen the force of the current on the bank. The piles may be sunk level with the water and be woven with branches to within nine inches of the surface, and above that a plank, nine inches by three, should be spiked on the landward side of the piles with its edge level with their tops. The space between them and the bank must then be filled up to the under edge of the plank with stones or rough gravel, or old roots might be tilted in the bottom, and any tenacious material used for levelling up with for the stone setts to rest upon; the first course of these to be kept level with the top of the plank, and the whole pitched with a similar slope as in the previous case. It may be here remarked that such an inclination is suitable for rapid running streams, and where the banks are of an open or sandy nature, but in cases where they are of a hard or stiff character, or where the stream is a sluggish one, a slope rising at the rate of 3 in 5 will answer.

When it is impracticable to secure proper stone setts for accomplishing the work, common field stones, or those found in the river bed, or beds of rough stone which may frequently be found lying in a bend opposite the spot that requires protection, can be used instead, and they are very suitable for the purpose when mixed with branches and brought up with a requisite slope. The work ought to commence at the lower end of the part of the bank to be operated upon, and a layer of branches should first be laid with their ends directed into the angle formed by the upright bank and the bed of the stream, and with their points into and down the current; the loose stones are thrown or tipped out of the barrows on to these and allowed to form a bed for themselves, but when they show above water they must be regulated into the desired slope, which may be a rise of 3 in 7 for a rapid running stream, and 4 in 7 for a sluggish one, and the face of the stonework which fronts up the river should incline downwards at an angle of

35 or 40 degrees. When there is a layer of stones of about one foot in thickness laid on the branches, another layer of these must be laid on the face already referred to, keeping their ends in the direction of the angle as before, and spreading out their points like an open fan all up the slope, allowing them to project two or three feet, or more, as their length admits ; another layer of stones should then be placed on these, keeping the smaller ones nearest the bottom of the bank, and facing up the outer slope with the larger ; branches are again added, and so with the same rotation until the whole is completed. The upper section of the bank can then be finished off with a sufficient slope where required, and willow cuttings inserted for binding it together. The shoots of these can be, when the branches which were mixed with the stones become decayed, layered down along the slope to the water's edge, when, if due precautions are taken in the layering, they will take root and flourish, and act in the same manner as did the branches, viz., by throwing the force of the current from the slope, and preventing the stones from being washed away. Not only will they do that, but the whole slope will ultimately become a mass of roots which will effectually bind the stones together.

If the work of protecting the banks is performed during early spring, it would be advisable to mix a few willow branches in each alternate layer of the others, but their ends must be either pressed into the soil of the natural bank, or kept well down in the water, or there will be little likelihood of their striking root. Willow branches placed in that position during the summer months, do not, as a rule, succeed so well as when their sap is in a more dormant condition.

Where the water happens to be deep, it is advisable, as in the case already mentioned, to drive a row of piles at a requisite distance from the bank, to suit the inclination intended for the stonework, if that be not done an enormous quantity of stones would require to be used in bringing it up from the bed of the stream with the angle desired, and then the current would gradually displace the stones underneath, and the whole would ultimately disappear.

In cases where the banks are of a tenacious character, sometimes a row or two of piles will prevent the encroachments of the stream. One row of piles along the front of the bank, kept a sufficient height above the water, having planks nailed on to them, or with branches packed behind, will be effective until the branches or wood-work become decayed. To be quite effectual, however, two rows of piles should be driven parallel with each other, and three feet apart, and with their tops about eighteen inches above ordinary water level, and branches placed across the lines and diagonally with the run of the stream, keeping their points well into the water, and a few sods laid on their thick ends and in between the piles to keep them

down; the bank behind must be reduced to a regular slope, and, if advisable, sown down with grass seeds. This instance the points of the branches throw the current off the bank, while the piles keep these in their places, and they also during floods catch *débris*, which lodges in the space between them, and in many cases a crop of alder or some other variety of plants, which may be indigenous to the banks in the higher reaches, will spring up; but failing that, such could be planted, and thus add further resistance to the power of the current.

As already remarked, the course of a stream during a heavy flood may be sometimes altered by an accidental obstruction lodged in its bed, and somewhat similar means may be artificially taken to direct the force of a current off any particular portion of the bank, or to straighten its course. With shallow running rivers stones may be used, thrown loosely together in the form of a jetty, jutting a suitable distance into and inclining down the stream; heavy roots would also serve the same purpose. In deep rapid currents short rows of strong piles driven into the river bed at suitable points, and woven with branches or faced with planking, will in many cases prove the most serviceable; but to ensure their stability they must be driven well into the ground, and in a line sufficiently inclined down stream that the force of the water impinging upon them may have as little effect as possible. Whatever methods may have been adopted in protecting or guarding river banks, they should always be inspected immediately after floods, and any break or displacement that may have taken place with the work, ought at once be rectified, so as to obviate further damage.

ANDREW SLATER, JR.

DOES FORESTRY PAY?

IN the September number of the *Forst und Jagd Zeitung*, published at Frankfort-on-Main, by Sauerlaender, is the first half of an article entitled "Does Forestry Pay? or, Remarks on the Schools of Gross Returns and Net Ground-rent." A bitter controversy has been carried on in German forest literature for many years between those who are satisfied with the greatest gross returns, and those who contend for the calculation of profits by the net returns from the forest land. We append the following extracts:—

Now, however, in Germany the imports are greater than the exports of timber. Further, our woods require for a long succession of years great preliminary expenditure on cultivation, road-making, watching and management, taxes and rates. The forest in a civilized country has become a species of capital which with the means of transport at

disposal may be realized in portions in a comparatively short period. A logical result of these circumstances is that we must regard the forest as a trade capital from which we may expect a rate of interest corresponding to its security and convenience. The high value which the forest has now reached forces on us the doctrine of the net ground-rent, seeing that the economical loss would be immense were this gigantic capital not to pay interest.

Quite apart from the effect which improved cultivation and management exercise on the capacity of woodland to pay interest, the proprietor has the question forced upon him, What is the importance for him of the principles of gross and net production; which system yields him the better financial results? In order to answer this question let us glance at the nature and consequences of the different theories.

I. The principle of producing the greatest quantity of timber.

This sets itself the task of raising permanently on a given area the greatest possible mass of timber. Its chief advantages would be briefly:—

(a) That it would yield the greatest quantity of wood for fuel.

(b) That it allows the greatest export of timber.

(c) That it gives the forester a tangible aim which is attainable so soon as he shall have determined the age at which the different coverts yield the highest cubic contents of timber.

It may, however, be objected that it takes no account of the cost of production; and does not even lay stress on the value of the product. Pressler interprets the programme of this school to be to cut down every covert as soon as and not sooner than its current yearly increase shall have dwindled to an equality with its average yearly increase. By average yearly increase is meant the total cubic contents (of a plantation or seed-grown covert), divided by the number of years it has been growing. The covert being hewn at that exact year and resown or replanted, would be again ripe after a similar period, and in this fashion would be produced the greatest quantity of timber which could be permanently reaped from a given area.

According to the requirements of gross or *brutto* production, a covert would be ripe if its current year's growth

In its 50th year were only 2·00 per cent.

„ 60th	„	„	1·66	„
„ 80th	„	„	1·25	„
„ 100th	„	„	1·00	„
„ 120th	„	„	0·83	„
„ 300th	„	„	0·33	„

of its total cubic contents.

II. The principle of the highest forest rent.

The principle so-called does not sufficiently consider expenses, nor allow expenditure to exercise its due influence on the length of the cycle. We may, therefore, regard it as identical with the foregoing. It aims at drawing the highest possible permanent yearly income from the forest by raising the most valuable sizes and description of timber in the greatest quantities.

Its good points are :—

(a) That it does, and will permanently continue to produce, not only all kinds of timber required for home consumption, but especially such kinds as by their higher value are able to bear the cost of carriage to great distances.

(b) That it tries permanently to afford the proprietor the highest possible yearly money income.

It must not be forgotten that this principle dates from a time when timber capital was difficult to realize. The woods then contained a large proportion of old timber of large scantling ; this brought much higher prices per unit than stems of lesser dimensions, there being in some cases no market for small trees at all. This state of things gave rise to the prejudice that only by raising timber of the largest dimensions, could the interests of the proprietor be adequately served. It was overlooked that the high returns could only be kept up as long as there remained a reserve of large stems, of ages ranging from two to four hundred years.

The Spessart system was long admired as the very acme of skilful forestry. The coverts were composed of beech and oaks with a cycle of 120 years. At the end of this cycle or period all the good sound and promising oaks were allowed to stand over for another 120 years. A second beech covert having now been started underneath by natural reproduction, the bare places would be filled up with clumps of young oaks. When this second covert came to be filled after another 120 years, the best of the 240 year old and 120 year old oaks would be saved from the axe for another 120 years, while beech, with an admixture of oaks, grew up beneath them as before. In this way were grown the heaviest oaks for the Dutch market. One of these oaks would be worth in its 240th year about 200 marks (or shillings), and it was considered a great triumph by keeping it growing to its 360th year to raise its value to 1,000 marks. The adherent of the principle of the highest forest rent regards this work of his forerunners with no little pride. The adherent of the school who calculate by the net ground-rent, on the contrary, says :—" If you had sold your oak in its 120th year for only forty marks and invested the money safely at 3½ per cent. compound interest, you would have done much better. One

mark at $3\frac{1}{2}$ per cent. compound interest for 120 years = $1.035^{120} = 62.06$ marks. So you would have had in the 240th year

62.06 × 40	2,482 marks
and the value of the oak which has grown up in the time	40 „
	2,522 „

and in the 360th year you would have compound interest at $3\frac{1}{2}$ per cent. on the total for another 120 years $2,522 \times 1.035^{120}$ or $2,522 \times 62.06$ 156,515 marks

and from the 120 year old oak of the 3rd generation	40 „
	156,555 „

or 155,555 marks more than were received for the 360 year old oak."

So, such 360 year old trees must attain 3,915 times the value which they would possess at 120 years, in order to pay interest at $3\frac{1}{2}$ per cent. on the timber capital alone, besides the capital which is represented by the ground, and the outlay for management. Who will then be astonished that the Dutch in their own country raise only quick-growing trees, with the shortest possible cycle, so long as they have good-natured neighbours to grow oaks for their palaces and ships, at a loss of 155,000 marks per tree? And the loss is still greater seeing that, notwithstanding every care in their selection, of every five such old trees two become rotten. Also, for carrying out this clever contrivance there is required a succession of three 120 year beech coverts,] which do not pay well, and whose growth is interfered with by the overshadowing oaks. Lastly, there is the loss which falls on the poor inhabitants of the Spessart district by diminished work and wages, there being less timber to fell and prepare.

Far be it from us to complain if the Government, to supply an indispensable demand in its own country, were to raise such timbers, yet it is open to discussion whether such supply, for the benefit of a few, and for the most part rich, citizens, should be produced at the expense of the many. Financially, however, it is not at all to be justified that such a concession, at such tremendous loss, should be made to a rich foreign nation.

In the October number the article is concluded. The writer answers the question in the affirmative, but with the reservation that long cycles, or periods of growth, say over 100 years, are unprofitable with present prices. "Exceptionally heavy timber," he says, "which can only be raised at enormous sacrifice of interest, must either be better paid, or imported from abroad, or some substitute must be found for it, such as iron." The principle of calculating by what is called the "net ground-rent," is explained chiefly by means of a numerical example. The ground is considered as a form of capital,

each unit of which can yield a return from the sale of timber only after certain long intervals of years. Any outlay therefore on such land is locked up for a long term of years, and must be charged at compound interest. In the example of calculation here appended known returns from one hectare (2·471 acres) of beechwood have been extracted from Burckhardt's tables, and from this basis has been calculated what would be the net value of the ground. Beechwood being used almost entirely for firewood is acknowledged to pay worse than any other kind of timber; but with a cycle of eighty years, its results are not unsatisfactory. One hectare of beechwood on a "good site," that is, with a combination of soil, climate, and exposure midway between "very good" and "inferior," yields, according to Burckhardt's tables, in its eightieth year, 377 cubic metres (1 cubic metre = 35·317 cubic feet), besides thinnings every ten years after its thirtieth year. Thirty marks are supposed to be allowed for preliminary expenses, and four marks per annum for management. Account is also taken of some secondary or extra returns from other sources than timber. The net value of one hectare of land is calculated as follows:—

At Years of age.	Yields Timber. Cub. metres.	Price obtained, deducting expenses of Felling and Sale.		Amount at compound interest to end of cycle of 80 years.		
		Per Cubic metre. Marks.	Total. Marks.	At 3 per cent.	At 3·5 per cent.	At 4 per cent.
30	9	3	27	118	150	192
40	17	4	68	222	269	326
50	20	5	100	243	281	324
60	19	6	114	206	227	250
70	17	7	119	160	168	176
80	377	8	3,016	3,016	3,016	3,016
	459		3,444	3,964	4,111	4,284
80 years rent of shooting at 0·25 marks per hectare				80	105	138
Grass from 1-10 years at 3 marks				270	389	560
Leaves and twigs in the 50th year				121	140	162
" " 60th "				90	100	110
Total returns				4,525	4,845	5,254
Outlay for assisting and completing the natural reproduction, 30 marks in the first year				319	470	690
Yearly outlay for management, 4 marks				1,285	1,677	2,204
Total expenditure				1,604	2,147	2,894
Amounts of returns, net				2,921	2,698	2,360
Factor which will give the sense of the same net returns accruing every 80 years in perpetuity						
$\frac{1}{1 \cdot 0 p - 1}$ p being percentage.....				$\frac{1}{0 \cdot 04}$	$\frac{1}{0 \cdot 05}$	$\frac{1}{0 \cdot 06}$
Net value of one hectare of land, net returns multiplied by the perpetual factor				303	184	107
Net ground-rent, per hectare				9·09	6·44	4·28

Similar calculations are then given for a cycle of 100 years, and also for a cycle of 120 years, which give inferior results. The article altogether attempts to prove that the best forestry is that which gives the best financial result, and that this financial result may best be tested by calculating what "net ground-rent" it would afford at a given rate of compound interest.



PLANTING UNPROFITABLE LAND.

THE object of this paper is to follow up the remarks which appear now and again in the *Journal of Forestry* in favour of planting unprofitable land with trees, and to show that the surest way to increase and permanently maintain the value of landed property, now being so seriously diminished by the prevailing agricultural depression, is to keep up a succession of young plantations, growing by day and by night into a sure and undisturbed store of accumulated wealth.

It is very well known that there are vast tracts of land in the British islands allowed to lie almost barren in unproductive wastes, although many years have passed since the formation of such lands into woodlands was found to be the surest way to increase their economic value; and we know that not a few of those early plantations grew up to be magnificent forests, and supplied their fortunate owners with a source of wealth which the land could never have produced in any other way.

Much has been written on the undoubted importance of increasing our woodlands, but comparatively little regard has been paid to the manifest proofs of their value which are constantly set before us; and it is only by reiteration we can hope at last to stir up an active general interest in the subject.

The rate at which planting operations progress is by no means commensurate with the enormous area of land in Great Britain which lies in an unproductive state, although teeming with the material elements of trees. The cause of this remarkable indifference is not so much the capital required in forming young plantations, as the long period necessary to bring them to a disposable value. Large sums are sunk readily enough in uncertain attempts to reclaim cold, stiff clays, and bare unsheltered moors and heaths, which have irretrievably swallowed heaps of gold during well-meant but imprudent attempts to bring them under arable husbandry; and truly the coming loss

may not have been very apparent while seasons were propitious, markets favourable, money plentiful, and high rents obtainable; but in these altered times it is evident enough in many cases that both landlords and tenants have sunk large sums in this way, which the land will never restore.

Now, if this misused capital had been expended in planting trees, the grievous decline in the value of farm lands would have been largely compensated by the increased value of the inferior lands which had been planted, and in the too probable event of landed property changing hands in consequence of bad harvests, American competition, and other causes; it will be fortunate indeed for the landowners who have thriving plantations of trees to counter-vail the now uncertain value of "Horn, Corn, Wool, and Yarn."

Our future supply of timber is a matter of national importance, and there is good reason to expect that the rapid exhaustion of European and Transatlantic forests will continue until foreign timber reaches a price that will stop its importation to this country. It is surely then the duty of the State to encourage the owners of large extents of suitable land, by granting them loans on very liberal terms, to enable them to proceed at once in forming plantations of trees which will not only uphold the value of their properties, but will also give much-needed shelter in exposed districts to grazing and arable farms.

I shall not dwell here on the details of the many successful plantations which have already been described in the pages of the *Journal of Forestry*, but endeavour to show briefly that well-grown trees will yield a bountiful return when they are reared under the care of experienced foresters. We shall take for example say, 20 acres of land worth 1s. per acre, and supposing the ground to have been planted with Scotch firs, intended to be cleared in 50 years, we shall show the profit it ought to realize by that time. The charge against the plantation will be as follows:—

Rent of 20 acres at 1s. per acre for 50 years, with compound interest at 5 per cent., amounting in round figures to	...	...	£	s.	d.
Cost of trees and planting them by contract at £2 10s. per acre, with compound interest at 5 per cent. for 50 years	...	...	510	0	0
			£707	0	0

In estimating the income from this plantation we assume that it has been properly thinned at judicious intervals, and well managed in every respect, with a view to leave on every acre 537 healthy trees 9 ft. apart, standing on the ground at 40 years from date of planting, which is not too close if the ground is to be entirely cleared at 50 years.

The value we put on these trees is made purposely low, to avoid the appearance of exaggeration, but it is not at all unlikely that 50 years hence timber will be greatly enhanced in price. We have, then, 537 trees per acre to dispose of as opportunity offers during 10 years still to run, which we do as follows :—

302 trees cut down, containing, say 4 cubic ft. in each at 6d.	£	s.	d.
per ft., or 2s. per tree	30	4	0
235 left to be cut down at 50 years, being 18 ft. apart, containing 7 cubic ft. of timber in each, at 9d. per ft., or 5s. 3d.	61	13	9
per tree			
Income per acre	91	17	9
And for 20 acres	£1,837	15	0
The charges against which, as before stated, being for cost of trees and planting them, and the rent of the land for 50 years, with compound interest at five per cent, is	707	0	0
	£1,130	15	0

being about 22s. 6d. per acre for 50 years from land worth only 1s. before it was planted with Scotch firs, and if it had been planted partly or wholly with larch a considerable addition to this amount would be obtained, the first outlay being about the same, and the value of larch timber higher.

It will be observed that we have not included the thinnings taken from the plantation during the 50 years which, under good management, would realize in many districts a return above the cost of cutting. Where there is no regular demand, thinning operations are often thoughtlessly begun at times in which they cannot be readily sold, when no injury would be done to the plantation by waiting a year or so for a buyer. Thinnings have in many places a certain market value at all times, and are likely to become everywhere more wanted for many useful purposes at present in abeyance.

It may be said that I am burdening plantations with a heavy charge for rent and interest, when in fact there are many thousand acres of good planting land which yield absolutely nothing to their owners in their present state.

It may also be said that compound interest at 5 per cent. is an unreasonable charge when money can be procured on easier terms. All this is true, and, if allowed, will reduce materially the charge against woodlands and augment the profit derived from them.

With regard to the cost of the dykes or fences required for the protection of plantations I would venture to suggest that it should be spread over the account for "General Estate Expenses," because there is an unseen influence proceeding from trees which undoubtedly raises

the value of an estate by ameliorating the climate, sustaining the fertility of arable land, and giving needful shelter to stock and crops in exposed districts; on this point I shall not enlarge, but refer readers to the interesting articles on the subject, by well-known authorities, which have appeared in the *Journal of Forestry* and elsewhere. If woods are of so much general advantage, the cost of protecting them ought not to be grudged, but viewed as a *quid pro quo*.

The healthy condition of a plantation of Scotch firs at 50 years might make it very desirable to allow the trees to stand until they were 70 years old, when the largely increased value obtained for them in their matured state would make it well worth waiting for. There are authentic records of Scotch fir at this age having been sold for upwards of £200 per acre, and we cannot give a better idea of such a plantation when at its 'best, than by quoting the following passage from an article on the Woods at Gordon Castle, which will be found at page 419 of the October number of the *Journal of Forestry*. "Passing on through the open park, a plantation was entered, in which it is safe to say the heaviest crop of Scotch fir is now growing that is to be seen anywhere in this country. Straight, clean, cylindrical stems, towering aloft without a branch to the height of 70 ft. and more, and of great girth, stand so thick on the ground that the eye cannot penetrate into the depths of the forest amid their colossal trunks."

In conclusion, I have great pleasure in wishing the *Journal of Forestry* a new year of increased prosperity and usefulness.

WM. BAXTER SMITH.

TREE PRUNING.

*Translated from the French of A. des Cars, by Charles S. Sargent,
Professor of Arboriculture in Harvard College, U.S.*

(Continued from page 576.)

YOUNG TREES.—Were it practicable to train young forest trees from their early years in the manner adopted in nurseries to form ornamental specimens, they might, no doubt, be greatly improved, but in planting on a large scale this is, of course, impossible, and it will be assumed that the young trees destined to serve as reserves have been entirely neglected up to the time of the first cutting over of the plantation.

Where it is the custom to cut over coppice once in every ten or

fifteen years, the young reserve trees are often weak and without a proper proportion of lower branches; and thus liable to break down under the too great weight of their tops. If the young trees are too weak to support a ladder, they must be bent down by the hand or by a forked stick, and the weight of the head reduced.



Fig. 31.—Method of forming a leader on a young tree twelve or fifteen years old.

The stem in the case of young trees should, if possible, be furnished with branches for two-thirds of its length; and if the leader is dead, or out of perpendicular, it should be cut off and a vigorous branch taken up to supply its place. This should be fastened in an upright position to the base of the original leader, and if some small branches can be left on this they may be used as withes to hold the new leader in place (Fig. 31).

If the young tree is not strong enough to stand alone, it must be supported by means of a forked stick placed against the side to which it inclines (Fig. 32), a cushion of moss or straw being used to prevent the bark from chafing against the support. It would be better to permanently stake and tie all such feeble young trees, but in a large plantation this is not practicable.

When coppice is allowed to grow for twenty years or more, the young reserve tree is less difficult to manage, has fewer unfavourable conditions to contend against, and has at least gained the advantage of sufficient strength to support a ladder; one of the upright upper branches can, if necessary, be used to form a leader; branches either too long or growing in the wrong direction should be shortened or removed to give to the head the elongated shape required to prevent the excessive development of the lower branches (Fig. 33). It may be well to add, too, perhaps, that in pruning a young reserve tree twenty years old the main branches should be shortened to about 3 ft., not including the branchlets left at their extremities to provide the tree with a sufficient supply of sap. Proportionately larger branches must of course be left on older and larger trees.



Fig. 32 — Method of propping up a young tree.

Young trees grown in poor or imperfectly drained soil, or under the unfavourable conditions arising from want of light, are often destitute of proper leaders. Generally, as has already been explained, a leader can be formed by straightening up a branch either by the aid of a wither fastened to one of the shortened branches (Fig. 34), or more simply by a small branch twisted round the branch selected for the leader (Fig. 35).

The new leader thus formed will soon begin to grow, and in a short time will entirely change the appearance of a stunted, sickly tree (Fig. 36), which, so treated, will become straight and vigorous.

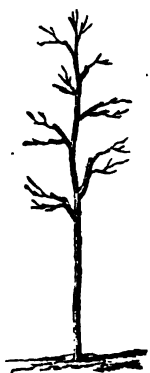


Fig. 33. — Young tree twenty years old correctly pruned.

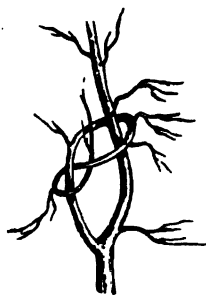


Fig. 34. — Method of forming a leader for a young tree by straightening up a lateral branch.

In the case of young trees with a forking main stem; only one of the leaders should be allowed to remain, and the one preserved should be the more nearly upright of the two, without regard to its size or

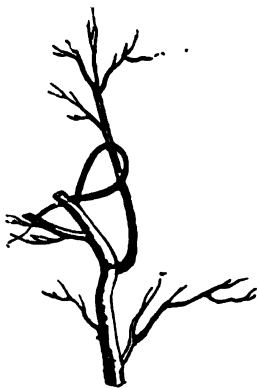


Fig. 35. — Method of forming a leader for a young tree by straightening up a lateral branch.

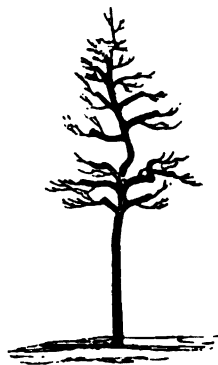


Fig. 36. — Badly-grown tree twenty to thirty years old. First pruning.

length. A strong strap, fastened to the stump of the suppressed branch, may, if necessary, be used to draw up the leader into a straight position (Fig. 37); when this is necessary proper precautions, however, must be taken to prevent the bark from being injured by the strap.

Often young reserve trees otherwise desirable to preserve are unable from the unfavourable conditions under which they have grown, or on account of injuries received from falling trees, to support their own weight, and bend over to the ground. When possible such trees should be straightened and kept upright by the aid of a wire fastened to a neighbouring tree. When a wire is used for this purpose it should be fastened to a branch, and not to the trunk, which it might, by its cutting and chafing easily seriously injure.



Fig. 37.—Removal of one of the leaders of a forked tree.

Should it be found impossible to straighten (Fig. 38) the young tree, it must, unless cut back close to the ground, with the loss of several years' growth, be shortened in at some distance (A) above the bend caused by the weight of the head; and above a branch (C) which, while furnishing the stump with sufficient sap, may be used as a withe to support in a vertical position the young branch (B) destined to form the new leader. The young tree thus reduced, and propped up with a forked stick, will in a short time, the conditions being favourable, become a handsome specimen. Such operations are important, and should not be neglected, because, as has been explained, it is often desirable to increase the capacity of

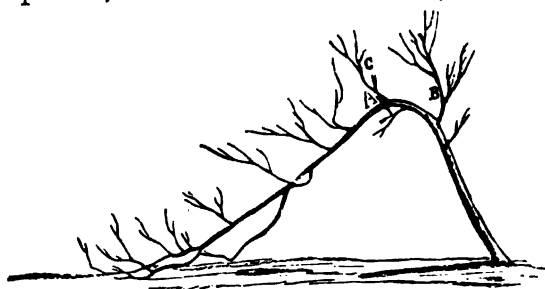


Fig. 38.—Young tree bent to the ground by the weight of its top.

a plantation to produce timber, by increasing the number of reserve trees in it.

Middle-aged Trees.—As has been explained, in woods frequently cut over, the treatment necessary for young reserve trees is often complicated and difficult; this is not the case with older trees. Trees of the second class constitute the most important part of the forest, and should receive careful pruning. This generally is not difficult, and there are few trees of this class which may not be either entirely restored, or at least very materially improved, if the necessary

suppressions and reductions are operated with judgment and courage (Figs. 39, 40).



Fig. 39.—Tree forty years old. First pruning.



Fig. 40.—Tree sixty or seventy years old. First pruning (second year).

The lower branches, which are often unnaturally developed and interfere with the growth of the rest of the tree, should be shortened to establish the proper form of head, while the leader should be treated in the manner already recommended (Fig. 41).

A tree operated on in this manner will often appear very bare at first; but at the end of a few years the head will have regained a sufficient development.

Old Trees.—It is hardly necessary to explain that old trees require more cautious treatment than younger ones, which may if necessary be entirely remodelled. In pruning an old tree it is not a question of a leader or of increasing the size; and it is only desirable to regulate the shape of the head somewhat, by shortening when necessary such branches as interfere, by their length or position, with the equilibrium of the tree itself, or injure other trees in its vicinity. The heads of old trees should, as far as possible, be reduced to a more or less rounded ovoid, the lower branches being the shortest (Figs. 42, 43).

The main branches should be left 6 to 12 ft. long, or even longer if they are furnished with sufficient shoots to regulate the flow of sap, although it may be well to repeat that the branches of the beech should not be shortened, unless it can be



Fig. 41.—Badly-shaped tree of the second class. First pruning.

done in such a manner as to ensure, by abundant foliage at their ends, the supply of sap necessary for the regular development of the tree. In shortening branches, it is difficult, especially for beginners in the art of pruning, to determine the point at which the operation is best performed. Practice and experience



Figs. 42, 43.—Old oaks. First pruning.

soon teach this, however; and even if a few branches die under the operation, no very serious damage has been done. Two or three large branches can be safely removed at one time from old trees; and, although it is not desirable to make many wounds on the trunk of an old tree, they are less injurious than dead and decaying branches, which produce cavities in the trunk that should be avoided at any cost. The branches of an old tree should not be allowed to interfere with the growth of a younger tree standing near and intended to replace it. In cases of this sort the branches of the old tree should be cut in on the side nearest the young tree much more severely than if it stood by itself (Fig. 44).



Fig. 44.

Veterans.—If a tree of this class has been properly managed, the length of the trunk should equal one-third to one-half of its entire height. The method of pruning very old trees does not essentially differ from that recommended for trees belonging to the last class. All dead or dying wood should be carefully removed, and all old wounds not covered with a healthy growth of new wood should be reopened in the manner to be explained hereafter.

All branches either disproportionately long or which might interfere with neighbouring trees should be shortened; and, should it appear advisable, one or two of the lower branches may be amputated. This can always be done without injury to the tree, and has the advantage of increasing the length of the trunk and stimulating the growth of the top of the tree (Fig. 45). A tree is never so old that pruning, if practised with judgment and skill, cannot prolong its life and increase its value.

The restoration of an old oak may be cited in this connection. This tree, which stood in a hedgerow, was probably 200 years old, and had suffered terribly from neglect and mutilation. The lower portion of the trunk was covered with the dead stumps of branches (Fig. 46), their numerous protuberances being filled with cavities and bristling with vigorous shoots. The top had begun to decay, and the tree seemed destined to speedy death. In pruning this tree, it became necessary to make, in the space of a few feet, no less than seven wounds, ten to twenty inches wide, in addition to many others of smaller size (Fig. 47). In spite of this heroic treatment the tree improved remarkably in health and vigour; and the numerous wounds made on the trunk by the amputation of dead branches entirely healed over, as may be seen in Fig. 48.

It must be acknowledged that, had this oak been left in the con-



Fig. 45.—Very old tree; first pruning.



Fig. 46.—Trunk of an oak injured by neglect and bad pruning.



Fig. 47.—Trunk of the same tree two years after treatment.

dition to which neglect had reduced it, or if nothing beyond lopping

off from year to year the young shoots developed along the trunk had been attempted, its decay would have been rapid and complete; without pruning it must soon have died without yielding anything more valuable than firewood.

The removal of numerous branches, for the purpose of restoring vigour to a decrepit tree, may seem opposed to what has already been stated in regard to the functions of leaves in elaborating plant food; and it might be argued that pruning must be injurious, because, in shortening or removing a branch, some of the leaf organs essential to the growth of the tree must also be destroyed. Such an argument is based on a popular error of very general acceptance.

It is often claimed that the healthy growth of a plant depends on the number of its leaves. It is not, however, the number of leaves, but the total superficial area of leaf surface, which determines the vigour of growth of the plant. An ordinary practice of the nurseries affords a familiar example.



Fig. 48.—Old oak restored to vigour by numerous large amputations.

A seedling tree several years old bears, perhaps, twenty or thirty leaves; its stem is not thicker than a quill, and it does not grow vigorously. If, however, this plant is cut down to the ground in the spring, it will be replaced, in four or five months, by a stout, vigorous shoot, often an inch in diameter, but carrying perhaps only six or eight very large leaves; the superficial leaf area of the new plant is larger, although the actual number of its leaves may be considerably smaller. This is what good pruning accomplishes; *i.e.*, while it may reduce the number of leaves on a tree, it increases their capacity to elaborate plant food through increased superficial area. Scientific pruning provides too, it must be remembered, an abundant leaf area on the branchlets left at the extremities of all shortened branches, and arranges the branches themselves in a manner to expose the largest surface of foliage to the oblique rays of the sun. It will be seen, then, that this apparent contradiction between the practice and theory of pruning does not exist; and that pruning, while it reduces, perhaps, the actual number of leaves on a tree, really increases its vigour by furnishing the largest possible leaf surface in the smallest possible space.

(To be continued.)

IVY HURTFUL TO TREES.

THIS is a subject which requires free discussion, and I will do what I am able to show it in its proper colour. Ivy (it is not controverted) is a very pretty plant, with a very pleasing appearance when seen creeping up the rugged sides of steep rocky cliffs, or when spreading its evergreen garment over the ruins of some dilapidated building. Doubtless also it is very gratifying to the eye to see it climbing up the sides of some mighty monarch of the wood, utilizing its organs of locomotion to carry it over every limb, and to the extreme of every branch, and the more so when deciduous trees have shed their leaves, losing thereby their most gay and fascinating attire and much of their natural beauty, remaining for a season desolate and nude; wherefore it is that anything that brightens and enlivens the dreary, sterile scenery of winter is most welcome to the human eye. But the eye only sees the surface of things; and taste with it is instantaneous admiration or contempt. The eye never penetrates beneath the surface, for that is an action that requires thought. Therefore, whatever the object of beauty may be, or however well-pleasing to the eye, it ought never to exist to the permanent destruction of objects of equal beauty, and of certain and more precious value. Such trees are; and ivy I consider most injurious to them. Why should beauty and value be sacrificed to beauty alone? Not for any reason conceivable. The quotation in the October number of the *Journal of Forestry*, quoted from the *Garden*, on "Ivy not Hurtful to Trees," is a statement with which I disagree. Repton, the author of that statement, gives the following reason why he concluded ivy non-injurious to trees,* viz. :—

"During the last two or three years, from having observed the timber in some very old parks and woods . . . where the timber was in greater perfection than at other places in the same neighbourhoods where the ivy had been most cautiously destroyed," &c.

To assume that the cursory observations of two or three years is sufficient to discover the character of ivy is assuming rather too much, and to base an hypothesis on the pith of those observations is more even than what a very submissive faith can consume: whereas perhaps half a lifetime is even too short to discern the operative character of ivy. Such illusory pleading in favour of the ivy appears to me very puerile; none the less it is sufficient to mislead people in its vindication who only view it with the adroit and enthusiastic eye of the painter, but who lack the opportunity of knowing its true character as a destroyer of trees and other things

* Written probably about the end of last or the beginning of this century.

upon which it may chance to fasten its tendrils. I agree with Repton that the tendrils of the ivy do not imbibe nutriment; those organs spring from the epidermis, and do not perform the function of absorbing food.

Now I will endeavour to show what my knowledge regarding ivy is; and that I should like to do without seeming intrusive and egotistic to the opinions of others differing from mine. The effects of ivy, whether beneficial or otherwise, will, I think, be seen in the consequent facts. Some years ago I had the honour of being forester over an extensive property in Wales, and much similar to the old parks of which Repton speaks: there was there too an old park and woods; indeed, there was wood of any age from fifty up to the great age of 300 years. At the period of my entrance on the estate, the woods everywhere were a perfect chaos of inert negligence, but, as I have got nothing to do at present with anything but the ivy, I shall confine my remarks to it. The ivy was nearly everywhere predominant throughout the whole area of wood; that is, it had got the precedence of the trees, and had subordinated them to such a miserable degree that, had it been left a short while longer to the immunity of its own subduing nature, undoubtedly it would have killed thousands of trees, representing hundreds of acres of land. There were hundreds of trees completely incoated with ivy, and this was no threadbare, shabby-genteel, thin-spun coating in numerous instances; for it was plied this way and that way about the trees to the thickness of from five to six inches, overrunning the trees from the base to the top, and every branch was absolutely clad with ivy to the very point.

So entirely had the ivy monopolized the tree and its members to extend and develop its own proportions, that in the foliate season scarcely a leaf belonging to the tree could be seen on any part save at the extremes, and, of course, in using the tree and its members, the ivy was also acquiring much of the tree's atmospheric food. I had the ivy cut off from a tree, and I found, after measurement, that the ivy stem ranged from eight to nine inches in diameter, climbing to the top of trees 60 to 90 ft. high, twisting and turning and impregnating itself into the spire, until the wood of the trunk had embedded it almost altogether in places, so that when cut off the tree it left a very unsightly corkscrew-like channel up to the point where it commenced to intersperse itself over the branches. Could ivy in such cases be otherwise than baneful to trees? I am sure it could not. At the end of two years I had all the ivy around the trees severed; and some years later I had the satisfaction and the opportunity of seeing my work prosper. The foliage forthwith became denser, healthier, and greener, and the whole appearance of the tree changed—changed

from pining sickness to robust and vigorous healthiness. And I fancy if the trees could have spoken of the change, when their ivy coats were cut away, they would have shouted for joy that they were released from the bonds and incarceration of a tight waistcoat.

Another similar instance of the injurious effects of ivy on trees came under my observation. This was a young oak plantation of fifty acres, and of fifty years' growth, situate in Cheshire. Here likewise I had the advantage to operate, and I did so much in the same manner as in the aforementioned instance, with results equally successful and satisfactory. I saw the plantation again six years after, and it was then a model of beauty and vigorous health, clothed in a dense viminal mass, about which there was nothing but what originally belonged to the trees, though long vitiated and morbid by the subordinating power of ivy; but at that time not a string of ivy was allowed to grow on the trees. I could multiply instances where I have known ivy to be more or less baneful to trees; but those already given seem to me so transparent that further substantiation might appear prolix and superfluous.

Besides the pernicious influence ivy has of gying and choking the free and luxuriant growth of the tree and its members, it has another very mischievous effect, which has hitherto been but slightly touched on, that is, the power to devour much of the tree's food. Now, it is a well-known truth that the food of plants is partly liquid, partly gaseous. Trees and ivy are plants which exist in the same fashion, and the food of the one is the food of the other. Therefore, ivy growing up the bole of the tree and spreading itself over every branch, must of necessity use vastly of both the liquid and gaseous food of the tree, and for that reason, if for none other, it is robbing the tree of that which ought to build up and add to its own body.

Further, Repton says: "I have found in the north of England that ivy is considered as a clothing to keep the tree warm." Such arguments look to me very puny and pithless, seeing ivy is not an essential covering to trees. Let trees never feel the advantage of such a garment, and they will never feel the disadvantage. And even after the tree has been long accustomed to an overcoat of ivy, yet I maintain it can be taken off the tree without detrimental consequences to the tree. Sever the ivy at the ground, then again three or four feet up the tree, take away the piece so cut, leaving the rest of the ivy to fall off of its own accord, which it will do in the course of two or three years, and thus the tree becomes gradually inured to its nude but natural state.

Much has to be conceded to Repton, or, at least, to his taste for the ideal, and to his admiration of the artificial and formal. His life's work chiefly related to that, and, if words speak the notions of a

man, his words show him swayed towards the artificial. This is apparent by the preference he gives to the foliage of ivy over the natural foliage of the tree.

As to the beauty of ivy on trees, I for my part could never see anything about it singularly pretty to admire, unless when creeping over some huge old trunk totally defunct. Any artificial gilding I think deteriorates from the actual beauty and natural habit of the tree. Even in leafless, lifeless winter there is a wondrous beauty in the noble open habit of a tree and its parts—a grandeur of beauty in its dilatation, when contrasted with its neighbour half-enshrined in a tattered garment of ivy.

Ivy growing upon a tree reminds me of nothing so much as the bits of evergreen hung here and there at random around shops and such like places about Christmas. True, what strikes the imagination of one as lovely might act on another in an opposite way.

To conclude, I have seen ivy on trees, and I have seen it off, and I confess I ever liked rather to see it off than on. Anyhow my experience persuades me to believe that trees thrive better without it.

HYPERBOREAN.



THE *HYDRANGEA HORTENSIS* AND *FUCHSIA* *RICCARTONII*.

FEW plants are better adapted for ornamenting the edges of drives and walks, or relieving the sameness caused by masses of the different evergreens, than the fine foliage and flowers of the *Fuchsia Riccartonii* and *Hydrangea hortensis*.

They are also much hardier than is generally supposed, having stood the last severe winter nearly, if not equally, as well as the *laurestinus*, which may perhaps be attributed to acclimation, as young plants are always raised from those growing on the estate. During severe winters the previous year's growths are generally destroyed by frost, but when pruned back early in spring and denuded of their dead branches they appear as fresh as ever, and produce blooms in abundance during the ensuing summer.

They appear to best advantage when planted in groups of from twelve to twenty in each, and 2 ft. apart, the best position being where a background of laurels or other high-growing shrubs can be obtained, and, if possible, where the ground rises from the drive or walk along which they are placed.

The clumps should be interspersed here and there, keeping each sort of plant separate, and not following any formal line, which in

most cases gives a stiff and unnatural appearance, but being guided to a great extent as to shape and size by the ground and surrounding objects.

Great care should be exercised in the laying out of plants in groups, as a few wrongly placed often mar the surrounding scenery, whereas if judiciously arranged they add beauty to it.

Here the *Fuchsia Riccartonii* attains a large size, frequently 10 ft. in height, and nearly as much in diameter; and in summer, when in full bloom and the colours enhanced by a dark background, it has few rivals amongst deciduous flowering plants.

The *Hydrangea hortensis* reaches from 8 to 10 ft. in height, and when covered with its beautiful masses of light pink flowers makes a fine contrast with the red and purple of the fuchsia.

Under certain circumstances the flowers of the *Hydrangea* turn quite blue, others being part blue and part the normal colour, the cause producing great diversity of opinion, but generally supposed to be the result of growing this plant on certain classes of peat-earth, or where aluminous salt is present in the soil. I have also learned from good authority that watering the *Hydrangea* with alum water during summer will cause the succeeding flowers to turn blue.

They are both easily propagated by inserting cuttings in sandy soil in August, and, having been transplanted, are at the age of three or four years fit for their permanent position.

They are by no means particular about soil, growing freely here in all classes, from sandy loam to shaly rock, although in the former attaining the largest size.

ANGUS D. WEBSTER.

THE AGRICULTURAL DEPRESSION, AND HOW TO MEET IT: HINTS FOR LANDLORDS AND TENANT FARMERS.

(Concluded from page 560.)

THE subject of the management of the highways is one of so great interest to both the owner and occupier of land, that a few additional remarks upon it will not be out of place. The road rate is an increased and increasing burden, which has of late years swollen out of all proportion to the improvements which have been effected upon the roads. Establishment charges may be credited with some share of the increased burden; but incompetency certainly claims the lion's share. Cumbrous machinery has, in many instances, been employed in former years; but even this had the merit of tolerable uniformity of action. Now chaos reigns supreme, and the bewildered ratepayer stumbles along over boulders in one part of the road, and

through the veriest sludge in another, while the drain upon his resources increases year by year.

The old system of turnpike gates, vexatious as it was to the late traveller, and costly to the trusts, had this one great merit—that it taxed the heaviest those who used the roads most. Cases of individual hardship there might be,—as when an occupier lived within a mile or so of a town and had to pay two tolls, while another might drive in eight or ten miles with the same outlay. But these were small matters, and might easily have been adjusted.

Owing to the permissive character of the Highway Bill of 1862, it has come to pass that up to the present time only one-third of the parishes in England are within the limits of Highway Districts. And in consequence of the annual vote in favour of the Turnpike Trusts Continuance Act, these roads in many instances went from bad to worse, and subsequently necessitated a very heavy outlay in those districts upon which the cost of their maintenance fell.

In 1875, Mr. Sclater-Booth drafted a Bill which proposed to charge one-half the cost of highways upon a rate raised by the County Boards. The constitution of such Boards is a matter of the deepest interest to the ratepayer, as any legislation which may now be undertaken after years of experimenting, may reasonably be expected to be of a permanent character. Tentative measures having long been tried, ample time has been given to test how much is worthy of being retained, and what part should be rejected. Considered in this light, permissive measures are undoubtedly good.

County Boards, or boards of control of any kind, whatever limits may be assigned to them, should undoubtedly consist of two classes of members, the one elected by the ratepayers direct, and the other chosen from their own body by the magistrates at Sessions. Both will thus be in a certain sense elective, and each may in turn act the part of moderator to the schemes devised by the other. From whichever side chosen, they should be men eminent for their practical acquaintance with the subjects brought before them,—men of sound sense and businesslike habits. Those chosen from among the occupiers should not be such as to justify the description of them given by an eminent writer in a recent number of the *Nineteenth Century*, who says:—"The elected guardians must unquestionably represent the ratepayers of the different parishes, while the presence, *ex officio*, of the magistrates resident within the bounds of the Union supplies a controlling and moderating influence. How little this can safely be dispensed with is shown by the erratic proceedings of the Town Commissioners in Ireland, where those boards are wholly elective, and have drifted in consequence too often into the control of the local publicans. We doubt whether the question will ever be satis-

torily solved until authority over our highways is delegated either to a provincial board, or to some body exercising a jurisdiction co-extensive in area with that of the Poor Law Unions. The difficulty of going at once to the fountain-head, in the shape of the Boards of Guardians, is to be found in the danger of over-taxing their capacities. Beyond their legitimate functions in the relief of the poor, they were recently clothed with authority in educational and sanitary matters. The length of their sittings has thus often been doubled, and a serious tax is thus imposed upon the time and intelligence of men who are not always overburdened with either."

Such criticism as the above is rather severe upon the tenant farmer who may chance to sit upon a Board of Guardians, and who may be well versed in every department of his own business, but utterly unacquainted with road-making. We do not expect the physician to be a good conveyancer, nor the sailor to be well up in the art of fortification.

It is to be hoped that the exhaustive evidence which has, during the last two years, been taken before the Lords' Committee will enable Parliament to approach this important subject in a manner which will ultimately relieve the oppressed ratepayer. Some further amendment of the Highway Act is absolutely necessary, the dis-turnpiking Act having already thrown upon county rates £200,000 per annum. The extra amount paid in rates is, however, not wholly a loss to the farmer, as he is now free in most districts from vexatious tolls. But the additional burdens have fallen particularly heavy upon those parishes with railway stations, towards which all the traffic of the district converges.

It is evident that one great aim of the successful farmer of the future must be the production of stock of the best possible kind, and also early maturity. To those who have the range of Australian and New Zealand bush, or the limitless prairies of America, it matters less what kind of stock is kept, as the small expense at which it can be brought into the market is certain to leave a margin of profit to the producer. But the tenant of rich marsh, or other pasture land, with a £4 per acre rental, and rates and other payments which add more than another £1, must keep stock of the best kinds, and fatten them out for market in the shortest possible space of time if he is to maintain his own. An example of what may be done in this direction is shown by the pen of three Hampshire Down lambs, belonging to Sir Edward Hulse, which were exhibited at the Smithfield Show this season. These were 40 weeks old, and weighed collectively 6 cwt. and 10 lbs. They had thus averaged an increase of 4 lbs. of mutton per week each from the time of their birth. No doubt, they had been liberally fed and well tended; but making a

fair allowance for this, they must still afford a very large margin of profit to the owner. And what had been done in this case is possible in hundreds and thousands of others, if the breeders will select with care, breed or cross with judgment, and fatten with speed.

Market gardening for farmers has been strongly advocated as a partial remedy for the present distress; and within certain limits, and upon the better class of soils, this may prove a great auxiliary. But the danger of relying too much upon the production of vegetables has been shown by the autumn of 1880, when it was impossible to dispose of the produce at anything like remunerative prices. The perishable nature of the goods and heavy carriage are very much against the success of the enterprise, when attempted to be carried on in places remote from the centres of consumption. But in the direction of fruit-growing, there is boundless scope for the farmer. Home-grown produce, coming fresh into the market, has always carried away the prize when opposed to the dried-up American apple, Jersey grapes, and the indifferent plums of Germany and the Netherlands. Black currants, raspberries, gooseberries, and some other fruits make immediate returns, and it does not require a very long lease to reap the benefit of plums of all kinds planted in hedge-rows and in selected spots, or odd corners of the farm.

In the matter of extraordinary tithes, so insupportable to the hop-grower and the market-gardener, the fruit-grower is more favoured. In his case, the full amount of the extra charge is not exacted at once. New plantations of apples, pears, plums, cherries, and filberts, are not chargeable for the first five years, and they are liable to only half tithe for the next five. Gooseberries, currants and raspberries are entirely exempt for the first two years, and charged one-half tithe for the next two. Mixed plantations of apples, pears, plums, cherries, or filberts, and of gooseberries, currants, or raspberries, are exempt for three years, and charged with one-half tithe for the next three. (See 2 & 3 Vict., c. 62, sec. 27.) In these days of enormous jam manufactories nothing need be lost of the produce of the gardens. And the demand even for unripe fruits of all kinds is so great, that even windfalls may be utilized.

One great feature in the fruit-growing industry is that it affords healthy employment for women and girls, at the same time that it stimulates other industries, such as osier-growing and basket-making. The Rev. William Lea, honorary canon of Worcester, in a little work on "Small Farms and Fruit-Growing," gives the following as the total of two acres of his produce in 1878, and states that the yield in 1874 was even larger than this:—

Green Gooseberries	2,407 lbs.
Black Currants	1,008 „

Coloured Plums	5,710 lbs.
Pershire Egg Plums	6,972 „
Strawberries	350 „
Apples	830 „
Pears	664 „
Quinces and Medlars	59 „
Filberts	47 „

Total produce of two acres 18,047 lbs.

Writing in 1879, Mr. Lea says that as the trees were then coming into full bearing, and averaging ten years old, the produce for some years might be expected to increase rather than to diminish.

Some remarks have already been made in these papers upon the subject of tenant-right, and it is to a wholesome development of this principle rather than to compulsory legislation on the subject, that the suffering farmer may look for some relief. The violent measures of self-appointed amateur legislators are never likely to find favour with the majority of Englishmen, whether landowners or tenant farmers, nearly all of whom prefer contract to confiscation, and fair bargains to wholesale robbery and spoliation. Nothing is easier than to work upon the sordid feelings of a suffering class by promises of large gains at the expense of other people. Communism in all its forms has attractions for the lower stratum of society, who have nothing to lose and everything to gain by revolution. And as much legislation as will give to the tenant full security for whatever he may have invested in his farm, and from which his lease does not afford him reasonable returns, may be demanded. But unless the power to add to farm-buildings, alter and rearrange these as well as farm-houses, plant hops and fruit, and effect a host of other so-called improvements, is curbed by the consent of the landlord, there is no end to the mistakes which may be made and the mischief which may be wrought. One tenant may for some particular purpose enlarge buildings such as stables, cattle-sheds, hop-oasts, &c., to suit his own particular hobby, out of all proportion to the extent of the holding or the capabilities of the land. These may add little or nothing to the letting value of the land, as the next tenant may wish to adopt an exactly opposite system of cultivation or breeding. Is the landlord to be saddled at the end of a lease with expenses from which he can thus derive no benefit, and which may even lower the letting value of his property? And if these matters are not to be provided for in a lease or yearly agreement, we shall shortly find added to the farmers' grievances costly arbitration and interminable litigation.

The agitation which has lately been stirred up by so-called farmers' friends, Professors, City Members and Aldermen, manufacturers

and agriculturists, half-landlords and half-tenants, who haunt the platforms of the country, seeking rest and finding none, is the necessary outcome of Liberal concessions to Irish tenants. But those who attempt to foist upon us Land Bills ready drafted and passed by acclamation at some few local meetings throughout the country, forget the wide difference which exists between the sturdy English farmer, fertile in resources and able, with a fair amount of sun and a considerate landlord to hold his own against the world, and the Irish tenant. As one of our daily papers remarked a few weeks ago:—"To throw over sturdy English occupiers the legislative shelter extended to Irishmen is like offering to John Browdie the protection required by Smike."

Our Chambers of Agriculture and other societies have done good work in encouraging discussion, and calling forth expressions of opinion throughout the country; and if their labours ended here, they would command a large share of support. But the extravagant programme which has recently been announced by the Farmers' Alliance, has had the same effect in England that the "No Rent" manifesto of the Land League had in Ireland. Moderate men of all parties are deserting a house which is doomed shortly to tumble about the heads of its builders. The defections announced in Canterbury at a recent meeting will be followed by others throughout the country. The press of the country is decidedly against it, and the London press is almost unanimous in its condemnation. Even Mr. Auberon Herbert, whom no one will accuse of being a landlords' advocate, or of being possessed of aristocratic proclivities, says:—

"Mr. Howard must have a difficulty sometimes in keeping his countenance as he urges the proposals of his Farmers' Alliance. He wants to unite in his own simple-minded person all the advantages of borrowing, and all the advantages of owning. All cream and no milk is the modest demand put into his mouth. There are certain disadvantages in borrowing, and certain disadvantages in owning. He will have none of these. He does not wish to purchase land at its market price; he does not wish to encumber himself with paying down the capital sum which will give him ownership; he does not even ask to purchase the buildings and permanent improvements, or to undertake the yearly outlay of keeping them in order; but he has the courage to ask that he should, at a stroke of the political wand, be relieved from all disadvantages which accompany, and must accompany, and ought to accompany every form of borrowing—that is, *ought* to if ownership is still to exert its magic influence upon men's minds and actions, and is not to be taken to mean first borrowing a thing from another person, and then getting an Act of Parliament to make it your own. In that case let me suggest to

Mr. Howard the title of a tract which is sure to command a wide sale:—‘How to get a thing without paying for it.’ The courage in asking shown by the Alliance tells us plainly that there exists in every class a reserve of selfishness and mental indolence which is always in silent rebellion against the strict impartiality of political economy, and is ready to break out into clamour to be helped at the expense of somebody else, as soon as ever the one safe rule of ‘Liberty for all, protection for none’ is publicly tampered with.”

In a recent letter to the *Times*, Mr. Auberon Herbert says:—“If property means certain rights over a thing, if the tenant is henceforward to be the depositary of the larger part of these rights instead of the landlord—and I think it will tax Mr. Howard’s ingenuity to point out a single important right that he has not in some form transferred either to the tenant or the tenant’s new friend, the Court—I can find no word or syllable in what I have written that I ought to modify or retract. I remark that his bill transfers rights of property from one class to another class.”

Instead of being misled by mock “Farmers’ Friends,” the southern agriculturist may well take a lesson from the procedure of his brethren in the North. These men in council together at Aberdeen, ask for the tenants “a legal right to compensation for their improvements, fair security of tenure, greater freedom in the cultivation of the soil, and the disposal of its produce;” and all this the average English landlord is quite ready to give. But the special pleading on behalf of the oppressed tenant farmer, which has for many months past been the staple of our platform oratory, is as distasteful to the stout British agriculturist in all parts of the kingdom, as it is repulsive to the common sense of the more intelligent part of the community outside the agricultural circle. Well may the astonished farmer, standing by the platform from which the fiery redresser of his wrongs denounces the landlord, the land-laws, and the land agent, exclaim with the client of Demosthenes, who was carried away by the eloquence of the great orator—“Until now I did not know how much I was wronged.”

A just cause for complaint with both the owner and the occupier of land, is the inequality of local taxation. While all parties in the State have signified their willingness to adjust these burdens, none have approached the task with sufficient determination to carry out any great reform. In a speech delivered in the House of Commons more than twenty years ago, Mr. Bright said:—“The taxes which now exist ought to be put on a satisfactory and honest footing, so that every man, and every description of property, may be called upon in its just proportion to support the burdens and necessities of the State.”

The great impediment to a fair adjustment is found in the extent to which men narrow their views to those particular imposts by which they consider they are most affected. While both landlord and farmer complain of taxes upon land, the holders of personalty are prone to limit their views to the supposed enormity of the probate and legacy duties. A third section concerns itself only with personal incomes and denounces the injustice of Schedule D., which makes no allowance for the precariousness of such incomes. Taxes on consumption engross the attention of working-class representatives. Taxation as a whole is seldom considered by any one party, so that its inequalities remain.

Eleven years ago Mr. Dudley Baxter, in a paper read before the Statistical Society of London, said :—"The taxation of Real Property—even after making allowance for the extent to which it ought to be higher than that on other kinds of income—is too high, and out of proportion to the taxation on the personalty and industrial incomes of the upper and middle classes. The taxes on occupiers are unequal and anomalous, and, in important portions of the kingdom, oppressive. Local rates offend against the elementary laws of political economy."

One great cause of complaint which affects both the landowner and the poor alike is the very small area of income which is liable to local taxation. £140,000,000 of rental had in 1870 to bear £18,500,000 of local taxes. And this taxation is constantly increasing.

There is no reason why land, which has hitherto been considered the best investment, both on account of its security, and also from the dignity and consequence which it confers upon its owner, should not be taxed higher than personalty. It is true that it yields a smaller return upon the outlay of capital, the gross income before deducting rates being not more than $3\frac{1}{2}$ per cent. It is admitted by political economists that land may reasonably be taxed one-fifth higher than personalty. Industrial incomes, on the other hand, from their precariousness, may fairly claim a lower rating, so as to leave a margin for savings and insurance. One-fourth the entire income is considered a fair exemption in such cases. The relative capabilities for taxation of the three kinds of income would thus stand as follows :—Landed property, $1\frac{1}{4}$; Personalty, 1 ; Industrial Incomes, $\frac{3}{4}$. But the proportions in which the real incidence of taxation falls upon the different kinds of property are as under :—Real Property, 11 per cent. ; Personalty, 7 per cent. ; and Industrial Incomes, $3\frac{1}{4}$ per cent.

It is evident that relief must be sought in a reduction of the present inequalities, and that a rate in aid should be raised from the unrated portions of Schedules D. and E. It is manifest upon the face of it that a rate of two shillings in the pound on the rateable value of a farm, or $8\frac{1}{2}$ per cent. on rental, is a very high tax upon land.

Mr. Mill's theory that only the present market price must be secured to the owner of real property is one which never yet has found favour in the eyes of the general public; for if this was admitted the State must also be prepared to guarantee the owner an indemnity against any future depreciation in value. Part appropriation by the State, whether by means of a Land Bill, or by any other system, is alike iniquitous. The unearned increment or spontaneous increase principle might with equal justice be applied to the cargo from abroad, which has nearly doubled in value by the time it is delivered in London; to the corn which the far-seeing speculative merchant has stored up in his warehouses; or to the increased amount of money which a demand for building sites enables the owner of town sites to make of his property. The formation of a railway opens up a property, and adds greatly to its letting value during a tenancy. Shall the State, or the creatures of the State, be entitled to the whole of this increased value, and the owner get nothing unless he goes into the open market to sell his estate?

One outcome of the prolonged period of depression, resulting mainly from the bad weather of late years, will be that in many parts of the country considerable breadths of land will come into the hands of the owners, and be farmed by them. It requires no very great foresight to be able to predict that in such cases where there is no lack of capital to properly stock and efficiently work such land, the greater part of it will remain in the landlord's hands when more prosperous seasons return. That even now where large breadths of land are retained as home farms, and worked with intelligence and skill, there is a considerable annual margin of profit, no one deeply versed in such matters will deny. The introduction of improved machinery, and the close supervision which a well-organized staff is enabled to give to the work, will ensure success under almost any circumstances. Improved methods of culture, improved breeds of cattle, sheep, and pigs, give largely increased returns; and it is morally certain that the landowner who once is fully awakened to these advantages will not readily forego them.

Should such a Land Bill for England as that which has for some months past been flaunted in the faces of the landed interest, be even hinted at by those in power, the owners will make a rush to get their land into their own hands, and the system which now so largely prevails upon the Continent—in Austria, Germany, Hungary, Denmark, and in Sweden—will soon become common in England. There noblemen do not scorn to farm their own estates to a very considerable extent. No difficulty need be feared as to the management of such estates. Throughout the country innumerable good men, men of wide experience in the cultivation of land and the

management of stock, have succumbed to the pressure of the times. From no faults of their own, but mainly from the succession of bad seasons, and perhaps in many cases from having launched out in business a little too wildly for their capital, they have been unable to bear the strain. Backed up by capital which will enable them to buy and sell in the best markets, and at the most favourable times, these men may be expected by close supervision to secure for their employers a good interest on the money invested in farming.

There are many other points in connection with the present condition of the agricultural community which it would be necessary to touch upon in any sketch which claimed to be comprehensive. But these remarks have already extended far beyond the limits which I prescribed at the outset, and must now be brought to a close. Looked at from an educational point of view, we are bound to confess that far too little use is made of those opportunities for observing the results of scientific experiments which the practice of our most advanced agriculturists places within our reach. The chemistry of the farm does not receive that close study which the publication of scientific treatises makes easy to all. The first principles of agriculture taught in youth and impressed upon the mind by experiments in the laboratory and in the field, would help on our practice, and greatly accelerate our progress. Charles Dickens happily said that the portion of a farmer's holding which is most deserving of cultivation is that little bit lying within the ring-fence of his own skull.

The labour question is another which deserves careful study. Work—honest, cheerfully-rendered, remunerative manual labour—has become a scarce commodity in the market, not because of a decrease in wages, nor from diminished physical strength: but from a moral deterioration, which is the natural outcome of vicious teachings and of a neglect to inculcate those principles which alone can bind the different classes firmly together.

After carefully watching the progress of agriculture for more than a quarter of a century, noting the risings and fallings of the barometer, I am still sanguine as to the future of the British farmer. The spring of the past year gave us a grand opportunity of cultivating and thoroughly cleaning our fallows; and during the early part of the summer the pastures revived, many of the finer grasses which we thought had disappeared coming forward vigorously. But for the wet harvest, the past season would have given the tenants of arable lands a considerable lift. And with a return of more genial seasons, with cautious legislation, and liberal concessions where the exigencies of the times render such necessary, prosperity will come back to the agricultural classes.

A recapitulation of some of the causes of the agricultural depression and their remedies may appropriately end this sketch.

CAUSES WHICH HAVE CONTRIBUTED TO THE AGRICULTURAL DISTRESS.

1. The absence of sun, and the excessive rainfall of late years, resulting in :—
 - (1). Short crops of cereals of inferior quality, small hay and root crops in many parts of the country.
 - (2). Rot in sheep, and a considerable amount of disease among cattle.
 - (3). Mould among hops, mildew in wheat, and blight of other crops.
2. The low prices of cereals, caused by poor quality and foreign competition.
3. The reduction in our flocks and herds from sheep rot and imported disease.
4. The low price of wool.
5. Excessive rating, and in some instances excessive rental.
6. Imperfect accommodation for the shelter and fattening of stock.
7. The disproportion between capital and extent of occupation.
8. The want of a proper organization and supervision of labour.
9. The consequent inefficiency of what thus becomes high-priced labour.
10. The extra expenses saddled on the farmer by the educational department, both in restraining the employment of boys and in Board Schools.
11. The excessive employment of middle-men, both in the sale of stock and other produce, and the purchase of manures, feeding stuffs, &c.
12. Expenditure disproportioned to capital invested in business.
13. Adulteration of manures and feeding stuffs, as cake, &c.
14. Too close an adherence to the notions of a former age.
15. Shortness, and consequent insecurity of tenures.
16. Low classes of stock.
17. The purchase instead of rearing of young stock, and importation of disease.
18. Too great a dependence upon corn growing, and too little attention to roots and forage crops.

SOME OF THE REMEDIES FOR THE AGRICULTURAL DISTRESS.

1. A fair amount of sun, genial springs, hot summers, and dry autumns.
2. Increased produce, obtained by means of larger outlays on a smaller acreage.
3. More home breeding of live stock, and less danger from disease.

4. Keeping only the best class of stock, and aiming at early maturity.
5. A thorough readjustment of local taxation.
6. More drainage, better accommodation, more care of manures, &c.
7. The reduction of holdings and employment of more capital per acre.
8. Close supervision and more task-work.
9. More personal attention to buying and selling, and more care in selecting seeds, manures, &c.
10. Better accommodation for young stock and feeding cattle, and for the making of manure.
11. A fair and equitable Tenant Right Bill, or an improved Agricultural Holdings Act.
12. Longer leases at fair rents and with proper freedom of cultivation.
13. The introduction of improved labour-saving machinery.
14. More roots and forage crops, more pastures, and consequently more stock and more manure.
15. Greater confidence between different classes, and a determination to work together for the good of all.

A. J. BURROWS.



AN ESTATE WORKSHOP.

WE have on a previous occasion advocated in these pages the establishment of workshops on large estates, wherein much of the rough and laborious carpentering and building work, &c., could be prepared. The outlay for machinery, &c., would not be large, and would give the proprietor a handsome return on the money invested.

Some very useful hints bearing on this subject appeared some few months ago in the *European Mail* from the pen of Mr. M. Powis Bale, well known as a writer on wood-working machinery.

Mr. Bale says: We will first consider the selection of a suitable site: this is a matter of great importance in securing economy of working. In building a workshop advantage should be taken as far as possible of a site securing good land or water carriage, so that timber may be readily brought to and taken away from it. If it is desired to convert heavy timber, the building should be arranged with large sliding doors at either end, so that the timber may be passed in at one end in the rough, and, after being worked through the various machines, passed out at the other as manufactured goods. A tramway should run down the centre of the building, and if the timber is very heavy an overhead traveller will be necessary. We

intend here, however, describing a small general workshop, as more suitable to general requirements.

Our illustration (Fig. 17) represents a plan of a general estate workshop. The building or shed is of one story, with platform above for timber, &c.; it is 57 ft. long by 35 ft. broad; it can be built of masonry or wood, as may be most convenient or desirable. Its general arrangement will be understood from the reference numbers, which are explained as follows:—

1. Office. 2. Stores. 3. Hand-power mortising and boring machine. 4. Carpenters' benches. 5. Rack for deals. 6. Blacksmith's shop. 7. Forge. 8. Fan blower. 9. Lathe for turning wood or iron. 10. Main shafting for driving machines (underground). 11. Pump for supplying water for estate or settlement. 12. Countershaft for "Estate Carpenter and Joiner" machine (underground). 13. Portable engine. 14. "Estate Carpenter and Joiner" machine, for sawing, planing, moulding, tenoning,

PLAN OF ESTATE WORKSHOPS

Scale 1 Inch=10 feet

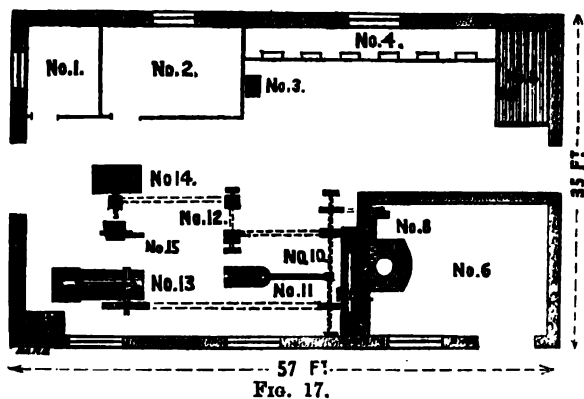


FIG. 17.

slot mortising, boring, rebating, tonguing, grooving, mitring, cross-cutting, &c. 15. Slot mortising and boring table for ditto. 16. Fuel for engine.

As regards motive-power for the workshop, if a suitable fall and constant supply of water is obtainable, we recommend a water-wheel or turbine as the most economical power to employ. As in many parts of the country, however, a large water supply is unattainable, a steam-engine must be employed. The type of engine we recommend is the portable, as in cases of emergency it can be taken from the workshop and used for pumping, sawing, &c., or in the harvest-time for driving a thrashing-machine. As regards the size of engine, a 10-horse power is the most suitable, but certainly not less than 8-horse power should be used. This should be constructed with an extra large fire-box for burning wood, &c., in addition to coal or other fuel. In fixing the engine in position, the fly-wheel should be placed exactly in a line with the pulley on the main shaft that it has to drive. This can be done by passing a string along the outside edge of the fly-wheel and the pulley, and moving the engine or pulley till the string bears evenly on all

the edges of the wheels. The engine must be fixed so that it does not rock when working, and the smoke-box end should be raised slightly higher than the fire-box end. The wheels can be let slightly into the ground with advantage. The shafting for driving the machines should be 8 in. in diameter, and fixed at a distance of not less than 20 ft. from the centre of the fly-wheel shaft to the centre of the shafting driven.

The shafting, for convenience sake, should be fixed underground, and run transversely to the building: the standards and plummer-blocks—the former are to be preferred—supporting the shafting can be fixed on brick piers or on thick slabs of wood. The shafting should be supported by bearings about every 8 ft., fixed at a dead level, and speeded to make about 250 revolutions per minute.

The machinery selected should be of simple construction, easily worked, and readily changed from one class of work to another. No. 14 on the plan represents such a machine. It is entitled the "Estate Carpenter and Joiner," and is from the designs of Messrs. Powis Bale & Co., wood-working engineers, 20, Budge Row, London, E.C. It will perform nearly all the operations required in a joiner's shop, including all kinds of sawing, both plain and feather edged, and an adjustable guide or fence is fitted by which any desired bevel can be obtained. Fencing, firewood, &c., can also be cross-cut to any desired length. By the use of a revolving cutter disc in place of the circular saw, floor boards, &c., may be planed any thickness, and the wood prepared for doors and similar work. Plain mouldings may also be struck and skirtings dressed, for which purpose a moulding block is employed in lieu of the planing disc. For cutting tenons two circular saws are employed, and the wood to be tenoned is cramped vertically and passed between them. The various operations of rebating, tonguing, grooving, mitring, &c., can also be performed with facility. For the mortising and boring of gates, fencing, &c., a mortising table (No. 15 on plan) and routing tool, fitted into the end of the saw spindle, are used. The depths and lengths of the mortises are regulated by stop pieces fitted to the table. The machine can be instantly changed from one operation to another, and with a little practice a labourer will be enabled to turn out a large amount of satisfactory work.

No. 3 on the plan represents a hand-power mortising and boring machine, adapted for mortising in hard or soft woods, or boring in wood or iron. With this machine all the lighter kinds of mortises—such as those used in door and other joinery work—can be cut with a truth and rapidity entirely unattainable by hand.

No. 9 is a 10 in. centre lathe, adapted for turning either wood or iron. In the latter case a slide rest replaces the ordinary plain hand rest usually used for turning wood. We need hardly add this machine is one of the most useful it is possible to employ, both for producing new work and for repairing old.

The various machines should be set to a dead level, and exactly at right angles to the shafting from which they receive their motion. The fan-

blower should have an impeller of 13 in. diameter, and make 2,300 revolutions per minute. This size fan will produce a blast sufficient for three fires. In fan-blowers of the best construction the outer casing is cast in two pieces, and divided horizontally just above the discharge pipe. By this plan the upper half of the casing can be lifted off, and the fan thoroughly cleansed as required. The horizontal joint should in all cases be faced, so as to avoid the objectionable plan of packing with red lead. All the working parts should be very accurately balanced, or, owing to the high speed at which they run, the bearings will very rapidly deteriorate. The bearings should be in length at least four diameters of the spindle. The spindles should be of steel, and efficient means of lubrication should be secured. The driving band should be of even thickness, and as pliable as possible. We think it necessary to make these few remarks on fan-blowers, as many of low price and inferior construction are sold, and when used cause much trouble and loss of time, at the same time producing an inferior blast.

The tue iron of the blacksmith's forge should be about $1\frac{1}{2}$ in. diameter. If much outdoor repairing work is necessary, an additional iron portable forge on wheels should be added to the plant.

The men employed should never be allowed to use the machinery haphazard, but one man should be placed over it, who should be made answerable for the condition of the saws, cutters, and other tools used; should this not be done they will generally be found out of order when wanted, as that which is every one's business is no one's.

In preparing wood for striking mouldings it should be cut feather-edged or to a bevel by the circular saw, and not left square, which is often done, and is extremely wasteful. The belting for driving the various machines should be run with the smooth or hair side to the face of the pulley, as a more regular and even grip over the whole face of the pulley is thus obtained. Duplicate sets of tools should be kept, in case of accident. All open oil ways should be protected from dust, and the bearings carefully lubricated and attended to.

With the plant we have sketched, a very considerable quantity and range of work can be turned out; all the joinery required in building a house can be produced, of better quality and at an immense saving over hand-labour.



THE PLANE TREE IN CHEAPSIDE.—Although I have known this tree from a very early age, says a writer in the *Gardener's Magazine*, I have never bestowed upon it more than a casual glance until a few days since, when I took particular note of its noble proportions. The stem is rugged, and shows that many a large side bough has been removed by the saw. But the head is perfect, and spreads in the most liberal manner, brushing the windows on every side. It has a body of soil for its support, and the winter rains no doubt suffice for its sustenance, but there is just no knowing where the searching roots may have tapped a gold mine, on which it can draw freely until some work of "improvement" shall cut through the roots or close the mine against them. It seems to me that of all the trees that have become venerable in London, the plane tree in Cheapside is the most venerable, and, considering its circumstances, the most beautiful and most noble of them all.

THE HOME FARM IN JANUARY.

ARABLE LAND.—Finish the ploughing of all arable lands for spring crops, and open good water furrows. Well scour the surrounding ditches and examine drain mouths. Cart manures on heavy soils, and plough in long. Plough close to the turnip folds. Put in winter peas and get other land in readiness for mangolds, tares, kale, cabbage, potatoes, and carrots.

Drainage upon arable lands should be finished as soon as possible. Suit the depths and distances to the nature of the soil. Here, upon our heaviest soils, 3 ft. deep and 18 ft. apart is very successful.

Hops may now be manured and dug or ploughed. Plant up dead hills and cart on manures. Get on new poles in frosty weather. Let the hills be moderately opened out early.

Live stock of all kinds should have fair shelter. Even the sheep will repay in health, manure, and general progress, with less food, for some attention in this direction. Cart manures to fields and clamps. At other times the farm horses may be laying in lime, salt, cake, manures, and delivering corn. Increase the supply of corn and cake to fattening bullocks. Give sheep—and more especially the ewe flock in wet weather—only a limited supply of turnips. In a very wet season the sheep should have a drier lair than the sodden arable land affords. Let the ewes be liberally fed, and not too closely folded. The success of the lambing season will depend very much upon the treatment of the flock throughout the present month.

Meadow lands for mowing should be cleared of stock early. Afterwards topdress and drag and roll down. Where irrigation is practised great attention should be paid to the hatches and watercourses.

Manures in clamps may be turned, and some gypsum, salt, chalk, lime shells (not quicklime) added in moderate quantities. Empty the tanks and cart the contents over the manure heaps, or use it for soaking heaps of fine bones laid up to heat and dissolve. Prevent as much as possible the washing of manures, and round off the tops of clamps to keep the wet out of them.

Hedges and ditches should now receive every attention. Live hedges should be the rule, and in order to ensure these lay in as little dead wood as possible. Also secure live stakes, and cut off some of these a little below the ordinary level.

Poultry must be warmly housed and liberally fed. A little buckwheat and some whole maize will be useful.

Estate work for the farm horses will be abundant—clearing the falls, and filling the timber yards and woodlodes, and laying in materials of all kinds.—*Pluckley, Kent.*

A. J. B.



ENGLAND.

THE probable suspension of planting operations during the present month should be taken advantage of to get forward with everything else likely to facilitate the work when open weather returns. Even holes for pitting upon wet soils may still be dug, and the work of planting will afterwards be done all the better for the amelioration which the soil will thereby receive. Composts or manures may also be got upon lands intended either for future planting or for nursery purposes, and road materials, fencing, &c., can be deposited *in situ*.

Plantation thinning will be proceeded with, and every opportunity should be taken for clearing the fallen trees, poles, and underwood. Open out clearance roads, and brush these before the land is cut up by the horses and wheels. Somewhat less than forty good brush fagots per rod will make a compact road fit for carrying all ordinary loads, and a little attention paid to these throughout the winter will keep them in condition for carrying out the bark and oak timber in the spring.

Coppice falling should be stopped in severe frosts, as the injury to the stools is very great, the blows of the axe loosening the hold of the fibres, and the bark afterwards being very apt to part from the wood, and thus checking the development of buds.

Trenching for new plantations is an operation which may go on throughout the winter whenever the soil can be broken up. The subsoil, though not brought to the surface, should be well stirred or broken up and left as open as possible for the action of frosts upon heavy lands. The rapidity of growth more than repays the outlay in trenching clay lands. In these days of steam cultivation the work may be done almost as efficiently with the cultivator, and more especially upon lands tolerably free from rock and old tree-roots, at much less than one-half the cost of hand labour. A fallow crop—such as potatoes or turnips—may then be taken sufficient to pay the expenses. But where this crop is intended to be carted off a good dressing of dung should be applied, unless the land is of good quality. The rougher the land is left after either trenching or steam cultiva-

tion the better ; but it should afterwards be harrowed down in time to keep out the droughts of spring and summer.

Prune up hedgerow timber, as this can now be done without injury to the adjoining crops. A removal of a few of the lower branches and the shortening of others will, in most cases, be all that is required. Dead hedges, and either laid or mildewed crops of corn, are generally the results of low-branched and overhanging timber.

Collect cones, which will now be in the best possible condition for storing, and afterwards give them every attention until March, when they may be thrashed out, or opened by the application of a little gentle heat, and sown.

Finish up as soon as possible the planting of new hedges, and the plashing, ribbing-in, and cleaning of old ones. Where the situation is very exposed, ribbing-in may well be deferred until the end of February or the beginning of March.

The proper drainage of all woods and plantations upon heavy soils should be a primary consideration with the forester. Instead of allowing the original ditches to become choked and filled up as time goes on, regularly clear and even deepen these as the roots descend. In noticing the damage done by recent gales throughout the country, it will be seen that large numbers of trees upon ill-drained and peaty soils, where the roots do not penetrate, were blown up, while upon even more exposed sites, but drier soils, the losses are comparatively trifling.

Pluckley, Kent.

A. J. BURROWS.

SCOTLAND.

CONTINUE the thinning of plantations, and the felling and cutting up of timber, as recommended last month. The timber market being still in a depressed state—especially for prop and spar wood—thinning should be sparingly executed in the hope that the market will soon improve. It should not, however, be delayed where it is necessary, as infinitely more damage and loss will be occasioned by the neglect or too long delay of thinning, than by the disposal of thinnings at an unremunerative price. In thinning, the future prospects and ultimate profit of the woodlands should be kept in view. Prepare and store fagots, and billets or firewood where required for home use.

Look over ditches which have not been cleared since the fall of the leaf, particularly those in which the leaves are likely to accumulate.

Repair fences. Look over all rabbit-proof fences and ornamental tree-guards. During a continuance of frosty and snowy weather, loss by rabbits might to some extent be avoided, were the branches of newly felled trees strewed upon the ground for them to feed upon.

Execute the trenching and draining of land, the grubbing of roots, and other ground work improvements.

Unless where much has yet to be done, planting might be deferred for a time, as the weather is generally frosty and changeable this month. If, however, a large extent has yet to be overtaken on dry situations, every opportunity of favourable weather should be embraced.

Turn compost heaps, and collect leaves and other refuse for the same. Topdress, trench or dig in the nursery. If weather and soil are suitable, store seeds from the rot-heap should be sown towards the end of the month, and cuttings of deciduous plants inserted.

Collect Scotch fir, larch, and other cones. If to be stored they should be gathered dry. Holly berries may yet be collected, and should be mixed with sand, as before recommended.

Darnaway, N.B.

D. SCOTT.

IRELAND.

CONTINUE felling of timber in pleasure-grounds and in fields; and have all material removed with as little delay as possible. Thin overcrowded plantations, collecting the thinnage into lots convenient for sale. All timber ought to be put into lots according to size, and regulated by local demand. Any timber required for domestic purposes may be felled and taken to the saw-mill, where it can be sawn during stormy days, affording employment for the workmen when little can be done outside.

If the weather be mild, trench and clean empty plots in the nursery, and plant out seedlings into lines. When much planting is done, no opportunity should be omitted in pushing ahead nursery work at this season, as it relieves the forester of much of his spring work. Planting hedges on top of ditches, if previously prepared, ought to be proceeded with. This part of the forester's duty ought never to be delayed beyond the end of this month. As hinted at last month, all operations which clash with farming ought to be in progress, as horse labour is more easily to be got when other works are not pressing.

Make up compost heaps; gather manure by every possible means. Road scrapings, parings of dykes, and scourings of open drains ought all to be drawn into the compost heap. Roads, fences, and obstructions in water-courses should all be attended to.

Ballinacourte, Tipperary.

D. SYM SCOTT.

WALES.

THE extreme mildness of the weather during the last three months, has been greatly in favour of planting operations, enabling extensive planters to push forward the work under the most favourable circumstances. As weather permits continue the planting of young trees, and preparing the ground for spring planting, by fencing, clearing, draining, &c.

The cutting of underwood and the thinning of plantations should be continued. Finish the cutting down of hedgerow trees as early as possible. Take advantage of frosty weather, and while the ground is hard, remove timber both from the hedgerows and from the plantations.

Bind up fagots, and prepare oven and fire wood for home consumption. Clear out open drains and ditches that may have been choked during thinning.

Keep fences of all sorts in good repair, and pay special attention to rabbit-proof netting where rabbits and ground game are numerous, as they are sure to destroy young plants during hard weather.

Where stones have not already been put on roads and drives, no time should be lost in having it done, so that they may get consolidated before spring.

Trench and turn up ground in the nursery, and cart leaves, &c., to the compost heap.

Kinmel Park.

LEWIS BAYNE.



ON THE GALE OF THE 14th OCTOBER, 1881.

THE clouds in threat'ning masses rise,
 To shroud in black the troubled skies ;
 The storm-fiend from his cavern springs,
 And back the closing curtain flings.
 Its tattered edges, severed, fly,
 In fragments dark, across the sky ;
 The storm-birds sound their shrill alarm,
 The forests quiver, dreading harm ;
 Oaks, alders, birches, sway anon,
 The pine, responsive, waves its plume.

O'er mountain, upland, plain, and dale,
 Now shrieks the devastating gale,
 The hedgerow trees that deck the plain,
 Their arms, like frantic maniacs, wave,

Their beauteous garb of golden hue
The fields and meadows now bestrew,
Their severed branches, leeward borne,
Seem haunted by the shrieking storm ;
In panic on they roll, they fly,
Till mangled in some ditch they lie.

The angry gale now blows amain,
Strong massive limbs are snapped in twain ;
Gigantic trees that bravely bore
The brunt of many an autumn storm,
Now rent and splintered, prostrate lie,
No more to wave their heads on high.
No more their robes of glossy leaves
Shall rustle in the summer breeze,
Nor from their boughs shall warblers gay
Welcome the spring with joyful lay.

From points of vantage may be seen
What seem like waves of gold and green,
Roll o'er the forest, rise and fall,
Crested with pines, or spruces tall,
They seem to clash and reel away ;
Twiglet and branch, resembling spray,
On every hand, lashed by the storm,
They form, they clash, break, and re-form,
Each lull disclosing havoc done,
Each blast announcing more to come.

The gale has blown its final blast,
And welcome calm succeeds at last ;
But 'neath the smiling, cloudless sky
What scenes of wreck and ruin lie !
Unsightly gaps disfigure, mar
The wooded landscape, near and far,
And in the forest and demesne,
Uprooted, rent, lie trees of fame,
Round which romance its halo flung,
And of whose beauty poets sung.

GILLIE-NA-COILLÉ.



NURSERY TREATMENT OF PLANTS.

SIR,—For fear it may be supposed that I advocate *no nursery treatment*, I feel bound to reply to your correspondent (Mr. J. Scott, page 598).

In explanation I may be allowed to state, that for most kinds of plants I consider good nursery treatment of vital importance, and that very many specimens would be almost worthless without such. All plants whose density of leaf and branch are essential points, cannot receive too elaborate treatment in the nursery, as on this depends their success; but there is a decided difference between this class of plants and those necessary to form plantations for profit, and, in some cases, for pleasure.

I doubt not your correspondent is a very good nurseryman, and has a wide and varied knowledge of plants, but he seems very defective in his knowledge of *practical* forestry, and it is on this latter part the question arises.

He (Mr. Scott) does not seem to be aware of the very large extent of *natural* woods in the United Kingdom; that these are grown from self-sown seeds few will deny, neither will they doubt the exceeding excellence of the timber of these woods, especially that of the fir and oak; this alone is sufficient to prove that nursery treatment can be almost, if not entirely, dispensed with, so far as the rapid and valuable production of timber is concerned.

Your correspondent refers in passing to the *Wellingtonia* and *Eucalyptus*, but I do not suppose that these fine specimens ever received any

treatment from a nurseryman, and this alone goes a good way to support my theory of "*seedling* or *seedlings* only."

As to planting with seedlings only, the success of this plan can be seen by your correspondent on the estates of Cawdor, Seafeld, and Ballindalloch. Many of the largest plantation on these estates were formed with *seedlings* out of the seed bed; healthier woods cannot be seen anywhere. Many millions of plants were required to form these beautiful woods.

If I may be allowed to quote from the writings of a thoroughly practical nurseryman and forester, I can show your correspondent that this system had been successfully carried out by him; I refer to the late Mr. John Grigor, of the Forres Nurseries, than whom none could give better evidence as to this class of work.

At page 58 of his "*Arboriculture*," he gives the following account of planting and its results:—

"The following was generally the number of plants (per acre) inserted at about three feet asunder:—2,000 one year seedling larch; 1,000 two year seedling larch; 3,000 two year seed native Scotch fir. . . . A few years after the formation of these plantations the one year seedling larch plants which had been employed could not be distinguished from those inserted at the age of two years."

So much for seedling plants. Mr. Grigor gives statements of facts as to the value of these woods. I have seen some of these and must say there is no exaggeration in these statements, as is too often the case.

The rough corner your correspondent refers to having just finished,

cannot in any way be taken as a proof against the seed and seedling theory; because, when people wish certain crops to grow they prepare the soil to suit such crop: no one would think of sowing wheat on a lea field without first ploughing it, and carefully preparing it for the seed.

Should your correspondent find it convenient, I would be very glad to show him the "glorious landscape" actually *clothed* and *covered* by the plan recommended by me, and in many instances far superior to those planted by the hand as seedlings or transplants, larch, Scots fir, birch, beech, plane, oak, silver fir, and spruce. Many of these are two feet in height for each year of their age, the wood is of first-rate quality and generally large of the age.

It may surprise Mr. Scott to learn that trees grown from seed *on the spot* produce a far greater amount of timber, and of better quality than that planted by the hand, are less liable to be overthrown by storms by having their tap roots unimpaired by nursery treatment, and are less liable to disease. Substantial evidence of these assertions are to be found in the natural forests of Strathspey, of which, however, only limited portions are now left.

While still maintaining that the nearer we come to Nature's laws, the greater will be our success in planting, yet the nursery is one of those institutions (if I may use the term) that cannot be dispensed with.

D. F. MACKENZIE,

Forester and Land Steward.

Murtly Castle, Perthshire.

MEASUREMENT OF TREES.

SIR,—In the November number of the *Journal of Forestry* you gave a report of a paper on "The Measurement of Trees, with special reference to the adoption of a more exact method of ascertaining their cubic contents for other than commercial

purposes," read by Mr. J. W. Barry, at the last meeting of the Scottish Arboricultural Society. I never take part in theoretical discussions, but am very much interested when I see practical papers such as the one alluded to. I, however, saw at once that it was very carelessly reported, and I waited in the hope that either the author or some one who was present at the meeting would have pointed out the mistakes. I was, therefore, much surprised to find only three unimportant *errata* noticed on page 614 of your December number.

At page 483, line 18 from top, I assume that "Hopper's tables" should be Hoppus's tables, and if so, then 33 ft. 7.4 in. should be 33 ft. 7 in. 4 pts., merely remarking that *parts*, or *twelfths*, are not *decimals*. 33 ft. 7.3 in. would be correct, but then that would not be found on "a reference to" Hoppus's tables.

Now comes a most extraordinary statement of what a mathematical friend, if he appeared on the scene, would say to the above measurement. This is, according to the report, what he would say: "Do you not know that the contents are equal to $\cdot 7854$ of the square of the mean diameter *plus* the height, or $\cdot 0796$ of the square of the circumference *plus* the height" (the italics are mine)? Let any one work out the problem according to the above rule, and he will be very much astonished at the result; it would certainly not be 43 ft. 4.10 in. Probably "a mathematical friend" would say something like this: "The solid content of a cylinder is equal to the square of the diameter multiplied by $\cdot 7854$, and by the length, or the square of the circumference multiplied by $\cdot 0796$, and by the length," that is supposing the diameter, or circumference, and the length to be of the same name, or ultimately reduced to the same name. Then working the example given of a tree 14 in. in diameter, and girth, deduced from the dia-

meter, 3 ft. 8 in., or 44 in., quarter girth, therefore 11 in., and the length of the cut being 40 ft. In accordance with the above rule for finding the content of a cylinder the result is 42 ft. 9.12 in., and not 43 ft. 4.10 in.

This example I will work out for the benefit of your young readers as follows:—

	Inches.
Diameter = 14	
Multiply by itself = 14	
	56
	14
	—
Square of the diameter = 196	
Multiply by .7854	
	784
	980
	1568
	1372
	—
Divide by 144	153.9384 square inches
	1.069 square foot
Multiply by the length = 40 feet	
	Ft. 42.760
	12
	—
	In. 9.120
Answer	42 ft. 9.12 in.

If you will allow me, I will, in my next communication, point out the defects of M. Goursaud's table as given at the bottom of page 483. Surely the Scottish Arboricultural Society will never print it in their Transactions as it stands, if correctly quoted in the *Journal*?

JAMES DUFF.

Freeland, Bridge of Earn.

[We have received too late for publication this month a letter from Mr. J. W. Barry, in which he states that the reprint of his paper in the Transactions of the Scottish Arboricultural Society will be from the original MS., and not from the report which was printed in our columns last month. Our report was correctly printed from the reporter's notes, and we shall be glad to hear from Mr. Barry after he has consulted his MS.—Ed.]

PROTECTING TREES FROM RABBITS.

SIR,—In an interesting article on the holly, by Mr. Robert Baxter, page 563 of your December issue, he refers to mine which appeared in your August issue, under the name "To Protect Trees from Rabbits," and he says, with reference to it, "I would feel obliged if he would let us know if he has tried the experiment of rubbing the tar on the trees in its cold state by means of a rag." In your August issue he found me distinctly describing how it should be done, yet he appears to doubt these statements, but is good enough to give us his reason why. "Because," he says, "up to this time I have found it necessary to give it a gentle heat, so as to spread it equally over the surface, and also to make the coating as thin as possible, and instead of a rag we use a brush." From this we learn that Mr. Baxter uses a coal-tar so very thick that it cannot be used, even with a brush, until it is first thinned by heating. Mr. Baxter does not appear to be aware that coal-tar can be got of various thicknesses, from that of thin black oil paint to solid asphalt blocks. When tar is pumped out of the tanks at the condensers of gasworks, creosote oil, &c., are distilled from it, in the process of which the tar is thickened to various consistencies, to suit the various uses to which it is afterwards applied. This thickening can be done by slow boiling in an open boiler, thereby allowing the vapours usually condensed into creosote oil, &c., to vanish into thin air. Now if Mr. Baxter wishes to try an experiment of this sort, let him get a barrel of tar pumped from the tar and gas water tanks of a gaswork, and let him boil it slowly, trying it occasionally until he finds it brought to the requisite thickness for use in a cold state, as described in page 266; he will then find how easily it can

be applied with a rag at about half the cost it can be done with a brush.

Mr. Baxter further says: "There is no doubt at all that tar has an injurious effect on the tender bark of young hollies, as I have seen them frequently die from its effects; in such cases it was a choice of the lesser of two evils." Here I quite agree with him, simply because, when heating the tar, his men, very innocently, no doubt, applied it at about the boiling heat of pure water, whereby they singed the young bark, and therefore killed the trees to which it was applied.

No doubt the experiment he has tried with Spanish chestnut or any other tree bark, similarly applied, will protect his hollies from injury by rabbits; but such bark can only be had during a short period of each year, whereas coal-tar can always be got: then there is the great difference in cost between the application of the two preventives.

Mr. Baxter further says, page 563, in reference to mine, page 267, "I confess that I do not see any analogy whatever between a tree and the human body as illustrating the points in hand." Most people (I do not say all) understand by the word "analogy" "an agreement or likeness between things in some circumstances or effects, when the things are otherwise entirely different." Now, the "point in hand," to which he must refer, is found on page 267, which, to put it briefly, is whether or not the free circulation of air or wind round the trunks of live trees, or round the limbs of living men, contribute to their growth and general comfort more than shelter does to the one or clothing to the other.

D. McCORQUODALE.

Dunrobin, Golspie, N.B.

SIR,—Mr. Baxter, forester at Dalkeith Park, will find the chestnut bark he has placed around his hollies

to be not only the simplest but cheapest and best method of preserving these from the attacks of game.

I would, however, suggest his using fine galvanized wire instead of rope yarn for tying on the bark, as, apart from lasting qualities, it is neater in appearance, and several trees operated upon in this way in the park here a number of years since have given the greatest satisfaction. Of course, in the case of trees and shrubs branched to the ground, it is impossible to protect with bark, but in such cases it is preferable to prune off a few branches up to the height of 18 in. or so, that the bark used may fit closely, but at the same time not too tightly, around the stem of the tree requiring protection. Three wires we find sufficient for each, one at the top and bottom, and one in the middle.

I also quite agree with Mr. Baxter that tar has an injurious effect upon the tender bark of young hollies, as, like himself, I have frequently noted the evil results, not to speak of the unsightly appearance occasioned thereby.

ANGUS D. WEBSTER.

Penhryn Castle, North Wales.

SIR,—In looking over the *Journal* for December, I was glad to see at page 563 that Mr. Baxter had been trying a new experiment in the way of protecting hollies by tying around the stems lengths of bark cut from Spanish chestnut. I am quite certain that it will make an excellent protection, *cheap* and easily applied, and I have no doubt but that it will be very lasting; but as I never had an opportunity of using the bark of Spanish chestnut for such purposes I cannot say what number of years they might stand good.

I have used the bark of larch for the same purpose upwards of sixteen years ago, and it is still sound, and will remain so for a long time yet. In fact, the bark of larch could be

made almost indestructible by time by slight coatings of Archangel tar.

Larch bark is generally more plentiful than chestnut, and can easily be taken off in suitable lengths, say from 18 in. to 4 ft. This depends much upon the nature of the locality where it is to be used, as in the Highlands of Scotland, for instance, I have seen the snow drifted to the depth of several feet and lie for some time; in this case rabbits could bark the trees to a great height.

As the peeling season is often a busy time with the forester, and other pressing operations prevent him getting the bark put on, it can be stored away in an airy loft until he find time for doing so. As the bark will then have become hard and will not open out without breaking, the best way is to steam it over a boiler, or lay it for a day or two in hot stable dung, when it will be made as pliable as leather.

In fixing it to the trees it should be sunk into the ground for a few inches; this part of the bark should be dipped in Archangel tar, as this will prevent the part in the ground from rotting away for a very long time. It is also a good plan to have the bark a great deal wider than what would exactly fit the stem of the plant, as it can be lapped over, and as the stem swells, the wire or twine used in tying can be slackened; the bark will then give way with the expansion of the stem.

In fixing the bark I always used small soft wire, which could scarcely be seen until quite close up to it, but rope yarn will keep the bark together for a good while.

The bark used for tree protection should be taken from trees from thirty years and upwards, as young bark would not last so well.

ARCHIBALD HENDERSON.

Tullamore, King's Co., Ireland.

TREES FOR PLANTING NEAR BRICK-KILNS.

SIR,—Your correspondent, "W. S.," in your last issue (page 600) has omitted to give the exposure and nature of the soil adjoining his brick-yards. It would be well, in the first place, to grub out the oak, hazel, birch, and thorns that have been destroyed, and thoroughly trench the ground. Should the ground be of moderate quality, and the exposure not very severe, a mixture of plane trees, silver or abele poplar, and horse chestnut, with Austrian pines as nurses, might succeed, with a few laburnum, *Pyrus japonica*, and privet on the margins.

N. W.

TREE RAISING AT PENRHYN CASTLE.

SIR,—During the late storm several Cornish elms were blown over in the park here, and amongst these one which, from the prominent position it occupied, could ill be spared from the surrounding landscape.

Resolved if possible to reinstate this tree, the attempt at which has been quite a success, I venture to give the mode of operation, which may perhaps prove interesting, if not useful, to others having a similar undertaking, especially as replanting large trees when blown over is rather a novel feature in forestry.

Before attempting to raise this tree, which was about 50 ft. in height, 15 ft. was cut from the top, which not only lessened the weight but also left less surface exposed to the storm when replanted.

Special facilities were afforded for raising this tree, as growing alongside were others to which the blocks and tackle used in lifting were attached. These being affixed, and also ropes from the top of the fallen tree to one on either side as guides, a number of men were put on the

rope to which the blocks were attached, and by steady pulling succeeded in raising the tree bit by bit to its former perpendicular position, the soil beneath the roots having previously been excavated and a bed prepared for its reception.

The large roots were then firmly pegged down, and all re-covered with soil, a coating of decayed leaves being placed on this to prevent too speedy evaporation of moisture. Three double wires were stretched from the top of the tree to the base of others in close environ, one on either side and one directly opposite that on which the tree had fallen, and being twisted to the tightness required, served not only to keep the tree in proper position, but also to prevent unnecessary strain on the roots when swaying with the wind.

ANGUS D. WEBSTER.

Penrhyn Castle, North Wales.

POLLARDING SCOTCH FIR.

SIR,—I have amongst my woods a hill-top about three-quarters of a mile long, soil very shallow, and exposed to every wind that blows.

Forty years ago it was planted with larch and Scotch, which did fairly well, the latter especially. The winter gales of late years have uprooted many of them, and I expect most will go in time. On part of the hill-top I have a healthy plantation of young Scotch coming up, and I propose when they get 10 ft. high, to cut the tops off and keep them from growing higher. The hill will have a well-clothed appearance, and they will make good game cover. Will some of your correspondents kindly say if the trees will remain quite healthy after this cutting? I propose planting spruce and treating them the same way. The thinness of the soil makes it impossible for full-grown trees to stand the wind.

Several uprooted beeches I have pollarded and pulled back into their places. Are they likely to live? A.

[There should be no cutting off of the tops. Stop upward growth by pinching out the top buds. If the stopping is done in time the Scots fir and spruce will live and thrive. Care must be taken that the trees have room to spread their branches. Thinning must be *very gradually* done, so as not to let in the wind. Beeches are not good subjects for such treatment; but if they are healthy young trees, they are likely to live.—ED.]

A SUGGESTION.

SIR,—I have been through many woods and plantations since the gales of Oct. 14 and Nov. 26–27, and have noted the immense quantity of dead, decayed, and live boughs of trees strewn about in them, and beg to suggest that they should be collected in convenient places for the labouring poor, and either given away or a small sum charged for them, say sufficient to pay the expense of collecting. This would be a real charity to many, for although the present does not promise to be a severe winter, still the quantity of firewood which will lie and rot would boil many a kettle. It must be understood that I do not suggest that liberty should be given to the poor to collect the firewood themselves, as this might lead to damage to the woods, &c., and other inconvenience, but only that the stuff should be gathered by responsible persons employed by the owner.

JOHN SMITH.

PRICE OF CHARCOAL.

SIR,—I fancy there must be a mistake in Mr. Webster's price of charcoal. (See page 475.) He quotes it at 2s. per bushel. I could procure him any quantity at 6d. per bushel, as it is now very cheap in this locality.

Herefordshire.

M. W.

HAWTHORNS.

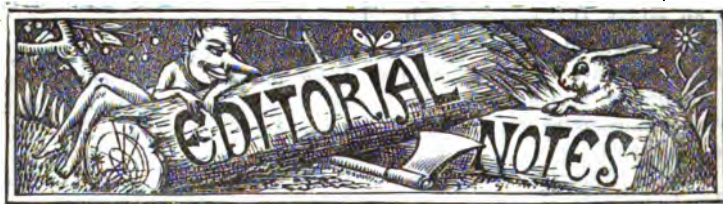
SIR,—I am anxious to know the origin of the scarlet and other sorts of hawthorns, and I will feel obliged

to any of your readers who can give me a short history of the leading varieties in your columns. Do the red, yellow, and other colours of haws always produce the same coloured fruits? Also, do the different sizes of haws produce similar ones? Any information on these matters will be thankfully appreciated by
A. L.

Notts, December 15, 1881.

[The varieties of hawthorn cannot always be raised *true* from the haw.

The seedlings almost invariably return to the normal type. Varieties are so readily increased by budding and grafting that it is of no importance when they do not come true from seed. Of course, all *species* of thorn (*Crataegus*) come true from seed. Our remarks refer to *varieties* only. Our correspondent will find the altitude of Farnsfield and Edwinstowe on the Ordnance Survey Contour Map for the district, which may be got for about 2s. 6d. through any bookseller.—ED.]



“A HAPPY NEW YEAR”

to all our readers, contributors, and friends, in all parts of the world, is the thought which at this joyous season first seeks expression in our pen. We hope the coming year may bring them a great store of health, happiness, and prosperity, and that success may attend their endeavours in whatever branch of arboriculture they may be interested or engaged. More and more attention is every year being attracted to the study and practice of forestry, and the fact that a crop of trees is the most valuable that can be produced on a considerable area of the land of these islands is gradually forcing itself on the attention of proprietors. The greater the importance of the subject of which our *Journal* treats, the greater our responsibility in conducting it in such a manner as to impart the greatest amount of sound and useful information and instruction, and the greater need we feel of the continued aid of our many valued contributors and correspondents. Their assistance during the last year

has been most hearty, and we take this opportunity of tendering them our warmest thanks for the past, and bespeaking their invaluable support in the future.

* *

Our remarks last month, upon the costly nature of the present system of training students for the Forest Service of India, and the moderate success with which the candidates in 1880 passed the preliminary examination, have brought us several interesting letters, which, in general, corroborate our opinions. Without exception, they strongly approve of the institution of a British School of Forestry, both on the score of efficiency and economy. Our correspondents comprise men of great experience in the Indian forests, Continental forests and Forest Schools, as well as in home forests and forestry; so that better proof cannot possibly be had than we have received of the pressing want of a forest school in this country. Among other matters, we are reminded by one correspondent that even under the

present system a few men, blessed with only very limited means, have succeeded in forcing their way to the front; which so far goes to prove our contention that there are hundreds more of the same class of clever and diligent young men who would be glad to enter the service, were they able to meet the cost, which, in no case of home training, need exceed half the amount now paid by the students at the French and German Forest Schools. We also learn from an able correspondent that our estimate of the success of the candidates in obtaining marks in the preliminary examination is considered somewhat hard on the young men, which we by no means intended, although taking into account the number that competed, and the comparatively easy nature of the examination papers, the average of the marks gained was nothing remarkable. The mere number of marks obtained in any such examination is certainly not an infallible guide to the merits and qualifications of the candidates, and we cannot doubt there were quite as good men, probably better foresters, who failed in obtaining a place among the coveted number as any of those who were successful; still, under the present system, they have no chance of being selected. In a properly conducted home institution most of the difficulties connected with foreign training could be completely overcome, and the best possible men trained for the service.

* *

The Scottish Arboricultural Society has just published a most interesting account of the recent excursion to the woods of East Lothian. In it the reader will find an excellent record of the day's proceedings, as well as many interesting incidents connected with the family histories of the owners of the estates visited, and the deep interest which many of them took in the management of their estates, and their embellishment with trees and

plantations. Nor have the charming landscape beauties of that rich district been overlooked by the writer of the report, who depicts them with rare ability in graphic language. The report is accompanied by a good plan of the celebrated Binning Wood, which is unfortunately without a title, the only blemish in the report. Next to joining in the excursion is the treat afforded to every member of the Society in the perusal of this report.

* *

From the *Proceedings* of the last Annual General Meeting of the Scottish Arboricultural Society just issued, we observe that *fifty-three* new members were added to the roll, which shows a large infusion of new blood and great vitality in the Society. There are, however, large numbers of landowners, foresters, and others connected with the management of estates, who still remain aloof from it. We are convinced that most of these have not joined the Society simply from the fact that it has never been brought prominently to their notice, and its objects and merits clearly explained. The Council of the Society ought to make an effort to bring its claims to support much more prominently before the public, and especially before every landed proprietor and forester, and should not relax in their endeavours until the aims and objects of the Society are fairly put before every person interested in arboriculture in the country.

* *

We learn also from the *Proceedings* that the important question of the education of young foresters is now receiving a due share of attention from the Council. A series of questions on the subject have been issued, to which the Council specially desire answers from all those who are interested in the subject; the answers to be sent to the Secretary before the 1st of February. The queries are as follows:—

1. What is your opinion as to the desirability of forming a Forest School in Scotland?

2. What do you consider would be the proper subjects of study in such a School?

3. What period would you recommend as a proper term of study?

4. Should the course of study be continuous, or consist of Summer Teaching, with practical work during Winter, Spring, or Autumn?

5. How many men from your county might be expected annually to take advantage of a Forest School?

Every forester is directly concerned in this important matter, and may be able to reply to one or all of the above questions. We trust that every one who has an opinion on the subject will freely express it; as by doing so they will substantially aid the efforts of the Society, and bring the question to a successful solution.

* *

The annual meeting this year is to be enlivened by discussions on "Judicious Pruning," to be opened by Mr. Wm. McCorquodale, Scone; and "Drainage in Connection with Planting, to what extent will it pay?" to be opened by Mr. Tait, Owston Park, Doncaster. We trust that two such important questions will receive the fullest attention of the members, and will be discussed in a thoroughly exhaustive manner; and for this purpose the Council should make proper provision, both in respect to the order of discussion and the time each subject should occupy.

* *

Among the subjects for competition this year, we observe that a separate class is, for the first time, offered for competition among assistant foresters *only*, which we trust they will take the fullest advantage of, by competing in such numbers as to warrant the Society to offer them still further privileges. No class of men have more leisure on their hands for self-culture; but owing to the

distance from a town at which many of them are located, it is not easy for them to fill up their spare hours by attending evening schools, or similar educational institutions. However, here is an opportunity given them for the practice of one of the best forms of self-culture. In writing a short essay or report, faculties and ideas are brought into play, and exercised in a wholesome and profitable manner, which in the course of an ordinary day's labour must lie dormant or nearly so. We need not press the matter more strongly on the attention of our young friends, as we believe many of them are most anxious to have an opportunity like this to improve their education and cultivate their mind.

* *

The Society offers in all a list of thirty-four subjects for competition this year, twenty-seven open to all, and seven to assistant foresters only. These embrace almost every topic of interest to the arboriculturist and practical forester, and members of the Society ought to enter far more heartily than they have ever yet done into the competition for these prizes. In doing so, they benefit themselves in the first place; next the members of the Society; and lastly the general public, who are not slow to appreciate good honest work, on a subject of such vast importance to the welfare of the country.

* *

Seldom has a season been so favourable for tree-planting as the autumn that has closed, and while farmers and others are complaining of the extraordinary nature of the seasons, the planter of trees has at least much cause for contentment. Growth was quickly made during the summer, and stopped early, so that most trees were in a state fit for transplanting at an unusually early period. Wise and energetic people at once perceived and took full advantage of this, and began their planting operations betimes. They are now reap-

ing the benefit of being early in the field by seeing an extra large breadth of plantations laid down in the best possible condition, and the prospect of a late, cold, ungenial spring gives them very little concern. It is far otherwise with the dilatory man, who has let the splendid season slip past while he has been only "thinking" about planting. He has missed his best chance, and is now tormented with anxiety about the endurance of the winter and the probabilities of a late and bad spring, when his planting must be done under disadvantageous circumstances, and the work rushed through with reckless haste. Numerous and costly losses are the vexatious result of such a thoughtless system, and those who practise it in these days of better knowledge deserve to suffer for their want of energy and perception. Every intelligent planter knows that there are but few circumstances in which it is not better to plant in autumn than in spring, and only in those few exceptional cases is it excusable and preferable to delay planting till spring.

* *

The severe gales of the 22nd and 26th of November appear, on the whole, to have been nearly as destructive to trees as the disastrous gale of the 14th October. So far as we can learn, the November gales were nowhere so fatal as that of the previous month to the trees and plantations within their range, but they were felt over a far greater breadth of country, and inflicted vast damage to trees throughout Ireland, and all over the Western sea-boards of England and Scotland. The result has been sad destruction to many grand old trees and thriving woods, and has thrown quite a glut of home-grown timber on the market. Much of the timber is naturally of inferior quality, or so injured by the storm and the fall that it is of small value, and the sooner it is cleared from the ground and disposed of the better. For such, it is better to

accept any price offered, than to allow it to lie and rot and encumber the ground. Still, there is a large bulk of fine timber trees which have gone down in the general crash, but lie with their stems quite uninjured. Where there is much of this best quality of timber, care should be taken not to force it into the market while quotations are so low. It will be much more remunerative a year or two hence, when the present glut will be exhausted, and when probably trade will have revived and much higher prices will rule. For the next season at least, the falls on most estates ought to be as small as possible. Much is to be made by those who carefully study the demand in the markets, and regulate their timber falls and sales to meet that demand when most lucrative.

* *

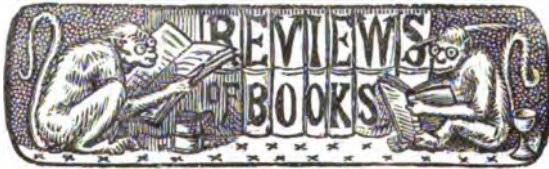
Few trees, and certainly no other conifer, form singly such a magnificent feature in the landscape as the cedar of Lebanon, but it seems to have been considerably neglected by the planter in recent times, as comparatively few are to be observed in the plantations and ornamental grounds formed within the past thirty or forty years. This may be partly attributed to the great influx of exotic conifers, of an ornamental character, which has taken place during that period, and partly to the slow progress made by the cedar in its early stages. When once it is fairly established in its permanent site, which it often takes ten or fifteen years to accomplish, it grows with great vigour, and often reaches a large size before it is a century old, especially if planted in a good soil and sheltered situation. It thrives best in a deep, rich loam, and an open or well-drained subsoil; but it is by no means fastidious, and will thrive in almost any soil which is neither stiff clay nor waterlogged. Planted as a forest tree, the cedar makes a straight, clean stem, towering to a height of 80 ft. or more,

and having much resemblance in the bark and bole to a gigantic larch, crowned with an evergreen top. Such a grand tree deserves to be much more extensively planted than ever it has been in this country, and planters will do well to bear it in mind when arranging for future operations.

* *

A number of fine old yews and hollies, which were blown over by the gale of the 14th of last October, at Dirleton Castle, Haddingtonshire, have, we hear, been successfully raised by Mr. Morrison, gardener to Lady Mary Hamilton, to whom the property belongs. The trees which

have been raised form a portion of those that enclose the ancient and picturesque bowling-green, and are probably nearly three centuries old, although, from the rather crowded state in which they have been grown, none of the stems are of extraordinary girth. The task of raising such hoary veterans must have been one of considerable difficulty, and it is very satisfactory to know that it has been successfully accomplished. Hollies and yews are excellent subjects to raise in this manner, and there is no doubt but these fine old trees at Dirleton will renew their life, and grow with vigour in their restored position for ages to come.



Fruit-Farming for Profit. By
GEORGE BUNYARD, F.R.H.S.
London: Edward Stanford,
10, Charing Cross.

A CONCISE treatise upon a subject which the present condition of agriculture has brought prominently before the public. The author's qualifications for the task he undertakes are the residence of a lifetime in the centre of the garden of England, and 20 years' experience in the management of the largest fruit-tree nursery in the kingdom. The result is just such a practical book as might be expected from one who has devoted his time and attention to the work. In a score of short chapters, written in plain but terse language, Mr. Bunyard discourses upon soils and situations for fruit-growing, cultivation — including planting and pruning — apples, pears, plums, and, in short, fruits of all kinds grown in the open air. His list of sorts are very complete, and

any one tolerably acquainted with fruit-growing in Kent can endorse nearly every sentence in the book. The chapter on packing fruits for carriage will prove especially valuable to the amateur, and the probable profits of the business are stated clearly and fairly. The enemies and diseases of fruit-trees are described at some length, and a careful perusal of the work will well reward the amateur fruit-grower, and give valuable information to the experienced gardener. Mr. Bunyard strongly advocates some of the older kinds of apple, which of late years have gone somewhat out of favour. He laments the sacrifice of quality to quantity, and remarks that since the introduction of the Paradise stock he has been able to raise fruitful and healthy trees, clean and robust, of the famed Golden Pippin, Margil, Ribston, Cornish Gilliflower, &c., and many other old sorts. The little work may be described as a

trusty guide for the beginner, and a most useful companion to all who take an interest in fruit-growing.

OUR FOREIGN EXCHANGES.

FROM Finland has been received *Finnska Forstforeningens Meddelanden*, third part, containing the first of a series of papers by Professor Blomqvist, Director of the School of Forestry at Evois, entitled *Finlands Trädslag i Forstligt Hänseende Beskrifna*. It is occupied entirely with a treatise on the *Pinus sylvestris*, discussing fully the natural history of the tree, its culture, and its seed, and diverse methods of sowing and planting. The different national names under which it is known, it appears, are these:—In Finnish, *Müntzpetaja Honka*; in Russ, *Sosna* in Swedish, *Tall Fur* or *Fura*; in Norwegian and Danish, *Fure*; in German, *Kiefer*, *Föhre*, *Forche*, *Forle*, *Fuhre*; in Dutch, *Pijnboom*; in French, *Pin sylvestre*; in Italian, *Pino*, *Pino comune*, *Pino sylvestre*; in Spanish, *Pino*; in Portuguese, *Pinheiro*; in English, *Scotch Fir*.

In the Spanish *Revista de Montes* are several papers interesting to the student of forest science. There are, amongst others, the conclusion of a memoir of a reconnaissance of the Sierra of Guadarrama, by Don Maximo Laguna y Villanueva; a detailed forestal notice of the region around Argeles, in the French Department of the Hautes Pyrenees; a reprint from the *Revisita Minera* of a report by Don Mariano Zuaznavar, mining engineer, on the artesian well of Vittoria, and a short notice of a paper in the Italian *Giornale de Farmacia*, on the antiseptic properties of the essence of Eucalyptus.

In the Austrian *Gartenlaube* are appearing a series of interesting papers on the nest-building of birds, and in the *Beilage* to the same a no less interesting paper on the

development of pianforte-building in Germany.

In the *Revue des Eaux et Forêts* is a paper by M. D'Arbois de Jubainville on the *Polyporus fulvus* Scop, in which the writer states that the fir is often affected by a white-coloured decay, produced by this fungus, which is a parasite pretty common in the fir plantations on the Vosges, in the Black Forest, and in the *Monts des Géants*, where its natural history was studied by Robert Hartig. The spores germinate sometimes on the cancerous wounds opened by the *Æcidium elatinum*, in spots despoiled of bark, sometimes on wounds occasioned by the rupture or the friction of the living branches. From such places the mycelium extends itself vertically in the young wood, and in the old it penetrates even the bark, and kills it. The wood thus affected becomes yellowish. At the boundary between the healthy wood and the injured there spreads a sinuous line, fine and of deep colour. This line is followed by many others like to it. Some surround those portions of the decomposed wood which are of a very dark yellow colour. The wood invaded by the mycelium of the *Polyporus fulvus* becomes very friable; the fir trees also break if they be pressed by the wind or by the weight of snow at the spots where the wood has been thus injured. The *Polyporus fulvus* fructifies at the places where its mycelium having pierced the wood and the bark, comes to the surface of the tree. The fruit-bearing receptacle presents a form analogous to that of the *Polyporus ignarius*, the so-called hard tinder, with its blackish, fawn-coloured, semi-orbicular head, often found on the upper part of the trunk of some oaks. It is distinguishable from them by its more yellow colour, never black, and especially the dimples, or form of pores existing on the upper face, a charac-

teristic wanting in its congeners. To prevent the considerable havoc caused by this fungus it is necessary to fell at once, or as soon as possible, all the firs infested with the parasite. Thus will be suppressed the production of the spores which propagate the dangerous growth; and, moreover, the immediate exploitation of the firs attacked

will permit of their being utilized before they have become valueless. Finally, as the spores of this fungus germinate, especially in the cankers and wounds produced by the *Aecidium elatinum*, it is prudent to exploit as speedily as possible all firs attacked by this deadly affection.

JOHN C. BROWN.



SUCCESSFUL TREE TRANSPLANTING.—During the building operations at Earnock House, Hamilton, it was found necessary to cut down or endeavour to transplant a large specimen of Turkey oak—a very handsome tree—measuring some 60 ft. in height, the bole 8 ft. from the ground being 6 ft. in circumference. Owing to the beauty of the tree, it was considered worth the trouble to attempt the transplanting. A site was selected some 30 ft. from its former position, and carefully prepared for its reception. A large trench 7 ft. from the bole of the tree was cut all round, care being taken to trace cut and preserve the whole of the roots. This was no easy matter, more particularly as oaks, as is well known, are often devoid of fibrous roots. However, a ball, weighing five or six tons; was kept together, and, with the assistance of two jib cranes to raise it from its bed, and a crab winch to draw it to its new home, it was safely transplanted, and there seems every likelihood that it will take root and flourish.

DESTRUCTION OF FORESTS IN RUSSIA.—A striking instance of the activity of man in destroying forests may be shown by the following figures, says the *Farmer*, which we find in M. Olshevsky's paper in the last issue of the *Ivestia* of the Russian Geographical Society. After having taken into consideration the surveys which were made in the province of Ufa before 1841, and the recent distribution of forests in that province, M.

Olshevsky shows that the area of forests, which formerly was about 17,577,000 acres, has now diminished by at least 3,500,000 acres, although the population is still very sparse, that is, less than three souls per square mile, and it was yet less some time ago.

TREE PLANTING IN SOUTH AFRICA.—The following is from the *Port Elizabeth Telegraph*:—"The marked improvement in the appearance of this town during recent years is in no slight measure due to the pleasing effect produced by successful tree planting. The physical features of Port Elizabeth do not offer many facilities for arboriculture and gardening pursuits, but persistent efforts in this direction have at last overcome some of the difficulties. Certainly at no former period have our public parks appeared to greater advantage, and the lines of trees along our thoroughfares, though only recently planted, are growing vigorously, and will soon form one of the most ornamental features of the hill."

PRESENTATION TO A FORESTER.—Mr. Kennedy, forester and ground officer on the Seafeld estates in Glen Urquhart, having accepted a similar appointment on the Lochaber estates of The Mackintosh, has on the occasion of his leaving Glen Urquhart been presented with a cheque for £66, subscribed by his numerous friends. Major Grant, factor for the Earl of Seafeld, made the presentation, and the health of Mr. Kennedy was cordially pledged.

THE JOURNAL OF FORESTRY & ESTATE MANAGEMENT.

THE FOREST OF DEAN.

THE Royal Forest of Dean, situated in the south-western angle of the county of Gloucester, adjoining Hereford and Monmouthshire, like most of our ancient Chaces, boasted in olden times of a far more extended range than it at present commands, though in this respect it has perhaps suffered less than any of its greater relatives; the river Severn on the east, the Wye on the west, and the Leadon on the north and north-east formed its natural boundaries, while the line of the highway from Newent to Ross, following the most convenient level in the gap between the Leadon and the Wye, defined its almost equally natural limits on the north and north-west.

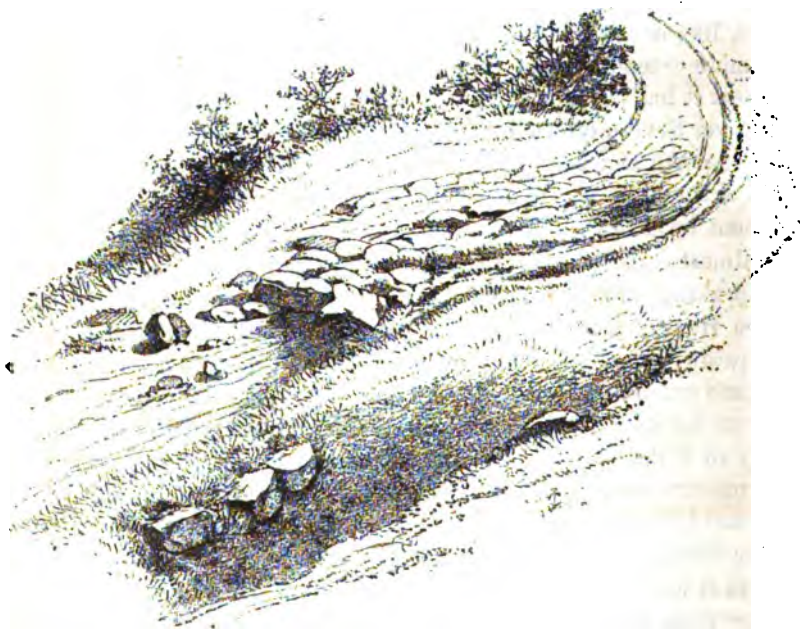
Speaking broadly, it comprised the upland country within the three rivers; a triangular area with its apex at Beachley below Chepstow, where the Wye discharges its stream into the Severn, and its base extending from Ross through Newent to Gloucester. It was famous for its iron mines and oaks in the days when the Cæsars held sway in Britain; when the illustrious Second Legion, after building the massive stone walls and gates of Gloucester (*Glevum*), was pushed forward into the heart of the territory of their ever-restless foes, the fierce Silures, and entrenched at Caerleon-upon-Usk (*Isca Silurum*), where it was stationed for three hundred years, to stop the devastating raids made by the warlike and unconquerable border tribes of Wales upon the fat and fertile Severn valley and the rich western slopes of the Cotswolds, within the Roman pale.

In A.D. 420 the eagles of Rome finally retired: the coins of Claudius, Gallienus, Victorinus, Domitian, Nerva, and Trajan found in extraordinary numbers at Whitechurch, Bollitree, Lydney, Coppet Wood Hill, at Lydbrook, Perry Grove, and Crab Tree Hill; the vast mounds of cinders near their old iron workings, and the marvellous paved highways which still form the principal thoroughfares, remain to tell us of the importance and prosperity of the district as far back as the commencement of the Christian era.

The chain of detached earthworks commencing with the lines of circumvallation which enclose the promontory of Beachley, the camp

and entrenchments on the high lands of Tidenham Chase, then the camp near Bearse Common, terminating in the triple ramparts across the neck of Symonds Yat, generally believed to be portions of the great barrier known as Offa's Dyke, thrown up by that king to prevent the invasion of his territory of Mercia by "the wylde Welshe menne," bring us up to the year 760.

The chronicles of Florentius Wigorniensis tell of an invasion by "the Pagan Pirates," under Ohterus and Hroaldus, who, sailing up the Sabrina (Severn), incontinently carried off the good Bishop Cymelgeac from the pleasant meads of Yrcenefeld (Archenfield) in

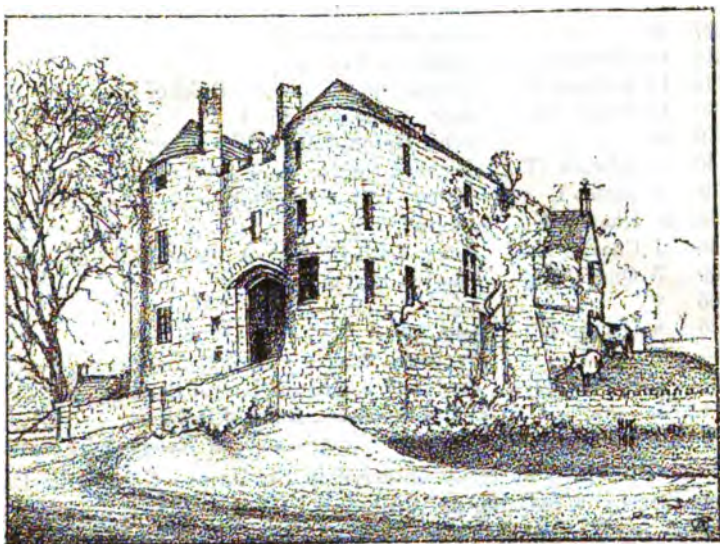


ROMAN ROAD IN SUDELEY SLADE.

the year of grace 912, whom King Edward ransomed for forty pounds of silver. But it is in Domesday Book that we come upon the first undeniable record of the Forest of Dean—"has tras c' cessit rex E. quietas a geldo pro forestâ custod"—and Edward the Confessor having thus exempted this forest from the payment of the *Danegeld*, it remained free from taxation under the dominion of the Conqueror. Already a Royal Chace, it became a favourite resort of the first of our Norman kings; and it was while hunting in it in the year 1069 that William received the news of the invasion of Yorkshire by the Danes. Roused to fury by the tidings, he swore with a tremendous oath that

not one Northumbrian should escape his revenge, an oath which he put into prompt and terrible execution.

Between the years 1120 and 1135 the Castle of St. Briavels was built by Milo Fitz-Walter, first Earl of Hereford, who appears to have been also the first Constable of St. Briavels and Warden of the Forest of Dean. In A.D. 1140 the Abbey of Flaxley was founded by Roger, the Earl's eldest son, who named it "The Abbey of St. Mary de Dene;" Henry II. subsequently confirmed the institution, and granted to the monks the right of grazing their cattle and feeding their hogs in the woods, with permission to use the timber for repairing their buildings,



ST. BRIAVEL'S CASTLE.

and to set up and maintain an iron forge. A little later on the same Sovereign gave permission to the Abbot of Flaxley to have both an itinerant and a stationary forge, with wood for fuel; the two consumed more than two of the largest oaks weekly, and to stop this devastation the king gave to the Abbey 872 acres of woodland, known to the present day as "Abbot's Woods." Quite recently Mr. E. Crawshay purchased from the present holders of Flaxley Abbey "the vert," and from the Government "the Venison" (hunting rights), of this estate, which has thus ceased to be the property of the Crown.

The Itinerary of King John shows that he visited St. Briavels on November 15th, 1207, and this, and other places within the forest bounds, on no less than sixteen occasions in the following years, his last visit being to Flaxley on December 11th, 1214. From this date we get in Bigland's County History a list of the "Constables and Wardens" in almost unbroken succession:—

A.D.		
1215	17 King John	John de Monmouth
1260	44 Henry III.	Robert Waleran
1263	47 "	John Giffard (Baron)
1263	47 "	Thomas de Claco
1282	12 Edward I.	William de Beauchamp, Earl of Warwick
1289	19 "	John de Bottourt (deprived)
1291	21 "	Thomas de Every
1298	27 "	John de Handeloe
1300	29 "	Ralph de Abbenhalle
1307	1 Edward II.	John de Bottourt (restored)
1308	2 "	William de Stanre
1322	15 "	Hugh le Despenser (senior)
1327	18 "	John de Nyvers
1327	20 "	John de Hardeshull
1341	14 Edward III.	Roger Clifford (Baron)
1391	14 Richard II.	Thomas de Woodstock, Duke of Gloucester
1436	14 Henry VI.	John, Duke of Bedford
1459	38 "	John Tiptoft, Earl of Worcester
1466	6 Edward IV.	Richard Neville, Earl of Warwick
1612	9 James I.	Henry, Earl of Pembroke
1632	10 Charles I.	Philip "
1660	1 Charles II.	Henry Lord Herbert of Raglan, Duke of Beaufort
1700	5 Queen Anne	Charles, Earl of Berkeley
1706	9 "	James "
1736	8 George II.	Augustus "
1755	27 "	Norborne Berkeley, Lord Bottetourt
1760	1 George III.	Frederick Augustus, Earl of Berkeley
1814	54 "	Henry Somerset, Duke of Beaufort
1838	2 Victoria	The Chief Commissioner of Woods and Forests

of whom the present representative is Sir James Campbell, Bart., Deputy Surveyor, residing at Whitmead Park, who was appointed to the office on November 11th, 1854, having previously been Deputy Surveyor of the Forests of Bere and Parkhurst. During the long reign of Henry III. pasturage was granted to the men of Rodley, who also in common with the king's people might hunt the boar. Commonage was likewise given to the Abbot of Flaxley. The bailiwick of Dean Magna was granted to Walter Wither. The men of Awre were allowed, by custom, pasturage in the forest; those of Rodley, estover, dead and dry wood, with pannage and food for cattle as well.

In A.D. 1282, the twelfth year of Edward I., a formal perambulation of the forest was made, and the boundaries were then precisely those which we have already described, although there seem to have been some few freehold properties within the bounds. About this date the Abbot of Gloucester purchased 36 acres of land in Hope Maloysell, held by Gilbert and Julian Lepiatte, receiving also the gift of all the lands of Thomas Dunn in the same parish. The most ancient of the justice seats for these parts sat the same year at Gloucester Castle. By its proceedings we learn that upwards of 72 "*Forgeæ errantes*," or movable

forges, were found here; that the Crown licensed them at the rate of 7s. a year; that a miner received one penny, or the worth of it in iron ore, for each load brought to any of the king's ironworks, but if conveyed out of the forest the penny was paid to the Crown, and that in those cases where a forge was farmed 46s. was charged. No less than 59 mines were let at this time to Henry de Chaworth, who had besides forges at work in the forest.

In this reign, probably at the time of this first perambulation (inasmuch as the bounds assigned to the forest in the document* we are referring to were those known to have prevailed at that time, but to have been considerably diminished soon afterwards), the king confirmed the charters and privileges of the foresters, which were even then regarded as ancient:—"Bee it in minde and remembrance what y^e customes and franchises hath been that were granted tyme out of minde, and after in tyme of the excellent and redoubted Prince, King Edward, unto the miners of the Forrest of Deane, and the Castle of St. Briavells."

Any free forester might, with the approval of the king's gaveller, dig for iron ore or coal where he pleased, and have right of way for carrying it, a third part of the profits going to the king, whose gaveller called at the works every Tuesday "between mattens and masse." Timber was allowed for the use of the works above and below ground.

The same document alludes to "the Court of the Wood" at the "Speech" (the Speech-house on the hill in the King's Walk) before the verderers, and also to the court for debtors at St. Briavell's Castle, and the Mine Court held by the Constable, Clerk, and Gaveller, and a jury of miners.

The forest oath was taken by "swearing upon a stick of holly," and no stranger or professional advocate could plead in the forest courts:—"And there the debtor, before the Constable and his Clarke, the Gaveller, and the miners, and none other folke to plead right, but onely the miners shall bee there, and hold a sticke of holly, and then the said myner demanding the debt shall putt his hand upon the sticke, and none others with him, and shall sweare."†

A record of the perambulation made in 1302 is preserved in the Tower of London, by which it appears that the forest had shrunk into very much narrower limits, which no longer extended from Chepstow by Monmouth to Ross, and from Beachley by Gloucester to Newent, but had retreated on the north to somewhere about the line of hills from Churcham by Blaisdon Edge, Huntly Hill, Longhope and May Hill to Lea, with a still greater shrinkage on both the south

* The document referred to is "The Miners' Laws and Privileges," published 1687.

† Extract from "The Book of Dennis."

and west, the towns and villages of Hewelsfield, Alvington, Ailberton, Lydney, Purton, Box, Rodley, Westbury, Blaisdon, Huntley, Longhope, Newent, Taynton, Tibberton, Highnam, Churcham, and Bulley, being no longer included (as they had been) within the bounds.

About this time the question was raised as to the Crown possessing the right of conferring the tithes of the "assarted" forest lands, not being within the bounds of any of the adjacent churches, and decided in the affirmative; the king, exercising his right, bestowed the tithes upon the Church of Newlands.

In the years 1310, 1311, 1315, 1319, and 1355 the foresters were summoned to furnish a quota of miners and archers for the sieges of Berwick; the unfortunate border town changed owners no less than sixteen times between 1174 and 1482. On one occasion 96 men went up to do military service; on another 200 were ordered to Northallerton, and "*20 of the strongest miners in the bailiwick of St. Briavel's*" to Newcastle-upon-Tyne. John de Abbenhall held his bailiwick by the service of guarding it with bows and arrows.

In 1333 Parliament confirmed the perambulations of 26 and 28 Edward I., which reduced the forest to the limits which, with some slight exceptions, remained in force till within the last fifty years. At this time the forest was farmed to one Guy de Brien, and the pay of the warden was one hundred shillings a year.

In 1450 the king's lands, manors, castles, and other possessions therein were granted to Henry, Duke of Warwick, for £100 annual rental. The singular perquisite of a bushel of coal, worth twenty pence, from each pit at the end of every six weeks, was now attached to the office of "*Capital Forester of all the Foresters.*"

After the battle of Edgecote, 26th July, 1469, Earl Rivers (the father of Elizabeth Woodville, recently married by Edward IV., to the great offence of most of his subjects) and his son, Sir John Woodville, fled hither, but were captured and carried to Northampton and executed.

Edward VI. farmed the forest to Sir Anthony Kingston.

In 1612 the Earl of Pembroke received a grant, entitling him to cut 12,000 cords of wood yearly, for twenty-one years, at 4s. per cord, and the lordship of the whole Forest of Dean, with the Castle of St. Briavels, &c., for forty years, at the yearly rent of £83 18s. 4d.

In 1613 an order dated 28th January was made, limiting the privileges of foresters to dig for ore, and they were henceforth "out of charity and grace, and not of right," to dig for mine, ore, and cinders; the latter were the ashes or refuse left by a former race of iron manufacturers, whose skill was too limited to effect more than the separation of a portion of the metal, but which the improved methods beginning to be introduced turned to good account.

The last justice seat in Eyre, or Supreme Court of Judicature for the Royal Forests, was held in 1635 at Gloucester Castle, before Henry, Earl of Holland.

The year 1638 is marked by the first effort which the Crown seems to have made to renew the crops of timber. A survey having been held, the report stated "that no more than 105,557 trees, containing 61,928 tons of timber, and 153,209 cords of wood, of which only 14,350 loads were fit for shipbuilding, was found, as the trees were generally decayed, and past their full growth." Under the direction of Sir Baynham Throckmorton, 17,000 acres were ordered to be enclosed, "leaving fit and convenient highways in and through the same." The commoners consented to this, upon some 4,000 acres being set apart for their use on the different sides of the forest; traces of the bounds of these allotments still remain. The carrying out of this judicious scheme was unhappily marred by the approaching convulsions of the great Civil War; and the necessity for raising money led to Charles I. selling the forest, with all that it contained (20th February, 1640), to Sir John Winter, in consideration of £10,000, and the yearly sum of £16,000 for six years, and of a fee-farm rent of £1,950 12s. 6d. for ever.

The forest was the arena of many a bloody fray during the conflict between the king and the Parliament. During a fight on 20th February, 1643, between Lord Herbert and the Parliamentary forces, under Colonel Berrowe, the market-house at Coleford was burnt down. The village of Little Dean was the scene of a tragedy.

Corbet says, "Lieutenant-Colonel Congrave, and one Captain Wigmore, with a few private souldiers, were surrounded in the house by our horse: these had accepted quarter, when one of their company from the house kills a trooper, which so enraged the rest, that they broke in upon them, and put them all to the sword." The spot where the two officers fell is near the fireplace in the dining-room at Dean Hall.



ENTRANCE TO DEAN HALL.

"Old Grange," a dependency of Flaxley Abbey, stands at the foot of the hill below Dean Hall.

Sir John Winter is credited with having made the most of his opportunities, and with having cleared off all the timber before the Parliament (29th September, 1645) granted it to their successful servant, General Massy. Sir John Winter appears to have been kept as a prisoner on parole, to go where he pleased within twenty miles of

London. During this time he seems to have taken the notion of making a special fuel out of sea-coal. Evelyn tells us:—"July 11th, 1656: Came home by Greenwich Ferry, where I saw Sir John Winter's new project of charring sea-coale, to burne out the sulphure and render it sweete. He did it by burning the coales in such earthen pots as the glasse-men mealt their mettall, so firing them without consuming them, using a barr of yron in each crucible or pot, which barr has a hook at one end, that so the coales being mealted in a furnace with other crude sea-coales under them, may be drawn out of the potts sticking to the yron, whence they are beaten off in greate halfe-exhausted cinders, which being re-kindled make a cleare, pleasant chamber fire, deprived of their sulphure and arsenic malignity. What successe it may have time will discover."



"OLD GRANGE."

In 1650 a Committee of the House of Commons was entrusted with the care of the Forest of Dean, and ordered all the ironworks therein to be suppressed and demolished, and the Government made vigorous efforts to re-afforest and preserve the timber in some 18,000 acres; the commoners resisted, riots ensued, and some 400 "cabins" were pulled down. This commission reports that they found 25,929 oaks, and 4,204 beeches, containing 121,572 cords of wood fit for charcoal as used at the iron furnaces, and 11,335 tons of ship timber, suitable for the navy.

In 1668 (20 Charles II.) a most important Act was passed for the enclosure and regulation of the forest. On 28th September, 1675, the forest was divided into six "walks," a keeper being appointed to each, and six lodges were built for their use:—1, the Speech-house, or King's Walk, after Charles II.; 2, York Walk and Lodge, after the Duke of York; 3, Danby Walk and Lodge, after the Earl of Danby, Prime Minister; 4, Worcester Walk and Lodge, after the

Marquis Worcester, Constable of St. Briavel's; 5, Latimer Walk and Lodge, after Viscount Latimer; 6, Herbert Walk and Lodge, after Lord Herbert. These names and divisions remain to the present day.

The Speech-house, for the use of the ancient "Court of the Speech," now known as "The Verderers' Court," was erected shortly after this. The escutcheon over the entrance bears the date of its completion, 1680.

In 1692 the following quaint remarks upon the forest were written by Dr. Parsons:—"It abounds with springs, for the most part of a brownish or umber colour, occasioned by their passage through the veynes of oker, of which there is great plenty, or else through the rushy tincture of the mineralls of the ore. The ground of the forest is more inclined to wood and cole than corn, yet they have enough of it too. The inhabitants are, some of them, a sort of robustic, wild people, that must be civilized by good discipline and government. The ore and cinder wherewith they make their iron 't'is dug in most parts of y^e forest, one in the bowells, and the other towards the surface of the earth."

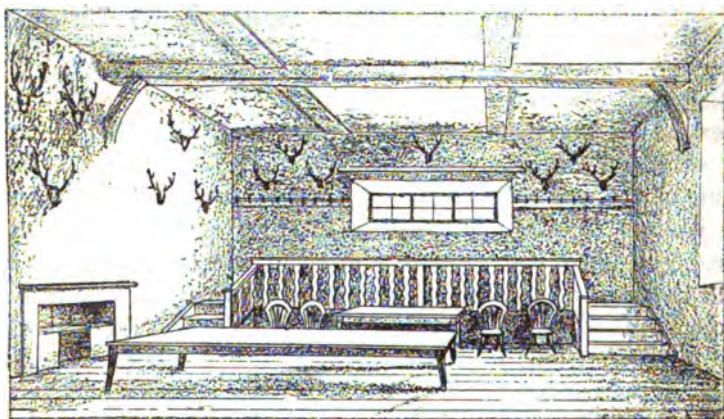


In this same year a commission reported that "there are great and valuable quantities of scrubbed beech and birch, with some holly, hazel, and orle, fit to be cut, being 192,000 cords, worth at 4s. 10d., amounting to £46,488; of which 12,000 cords might be cut every year, worth £2,900; or, as the total quantity of such woods was 615,000 cords, their worth at 4s. 10d. was £148,745 16s. 8d., to which £60,000 may safely be added for future clearings, if a twenty-one years' lease be granted."

This report adds, that should iron-making again be allowed, "it would utterly destroy the forest, now the best nursery for a navy in the world." Viewing the places where the last fellets for cordwood had been made in 1690, they state that "a very great stock has been left upon the ground for timber, and all imaginable care taken by the officers employed in making the said fellets, and preserving all the stores and saplings, with the principal shoots of such beech as grow upon old stools, well sheltered by other woods, for the improvement thereof." The sum-total of salaries paid to the conservators and keepers was £210 per annum, covered by wood sales.

In the year 1705 Edward Wilcox, Surveyor-General of Royal Forests, reported that he found the enclosures "very full of young trees, of which two-thirds were beech, overtopping the oaks to their

injury, and he recommended that one-sixteenth part, or about 700 acres, should be annually cleared and fenced in, which would yield a profit to the Crown of £3,500 a year, and leave the standard oaks and beech to grow to perfection." Petitions against this proposal were made by the commoners, and the matter was referred, but the law officers ruled that "no claim or right of common could prevent the enclosing, keeping in severalty, or improving, as Her Majesty should direct, the 11,000 acres mentioned in the Act of 20 Charles II. and preserving the same as a nursery of wood and timber only." Sir Robert Atkyns describes its condition at this time as "containing only



COURT-ROOM AT THE SPEECH HOUSE.

six houses, which are lodges for so many keepers. There had been many cottages erected, but they had been lately pulled down." Speaking of the different Forest Courts, he says, "The Swainmote Court is to preserve the vert and venison, and is kept at the Speech-house, which is a large strong house, newly built in the middle of the forest for that purpose; there is another Court called the Miners' Court," &c., &c. The room in which most of these Courts were and are still held is in the south-west angle of the front, on the ground floor; it is a plain-looking apartment 25 ft. long by 23 ft. broad, and about 10 ft. high, with a raised gallery, "the bench," along the southern wall. Not many months ago a board of the flooring of the gallery having given way, Mr. Boyce, the custodian of the Court, and worthy host of the hotel portion of the building, had the curiosity to descend through the opening, and found that the dark space underneath had been used as a convenient receptacle for all sorts of odd rubbish. Amongst other treasure-trove from this stow-hole, he has preserved a curious collection of old, worn-out, pointed-toed shoes, with high heels; and the copper plate of a hound's collar bearing the inscription

"Sir Edm^d. Winnington, Bart., Bewdley."

A number of clean-picked "shanks" of deer told pretty plainly of forbidden feasts upon "Light-foot," held in this very room; the dangerous relics, evidence of liberties taken with the king's venison, having been hidden away beneath the very "bench" itself, the awful judgment-seat before which poachers and other delinquents stood and trembled, and upon which the king's verderers sat to award punishment for the infringement of forest law, which at one time, in the days of Canute, was apt to be sharp, as the verderers were empowered to strip an offender, "a trespasser of y^e Vert and of y^e Venison," of his skin, and to nail it on to the door of the Court-house as a gentle hint "to all whom it might concern." This particular punishment was for serfs only; a freeman "who shall hunt one of y^e king's deer till he be blown" was permitted to condone the offence by paying a fine of 10s., equal to about £20 of our currency.

Hotel accommodation of no mean order is afforded by the building, the Court-room being used as a dining-room for visitors on days when "the Verderers' Court" is not in session. J. Y. H.

(To be continued.)

THE BEAUTIES OF BRITISH TREES.

THOUGH the forester in general looks mainly towards pecuniary profit, in estates management the choice and grouping of trees for individual beauty or the joint effects of contrasting forms, or lights and shadows, have often to be considered. I propose in this series of notes to indicate the charms which occur to me as I marshal in alphabetical array our British trees, to look at these trees from an æsthetic and artistic rather than from an economic or a technically scientific standpoint. Still the time has gone by when we could merely stand agape at the wonders and beauties of the world; we require now, at least, some attempt at an analysis of the origin, purpose, and significance of these things, and we must often accordingly look a little beneath the surface, and take a more than cursory glance at the objects of our admiration. We will therefore leave the gaping to the letterpress of drawing-room picture-books. As "objects of our admiration," I ought to be allowed to group all our trees; for, attentively considered, each has some charm, beauty, or interest, and, as Robert Boyle wisely said, "naught can be beneath the notice of man that it was not beneath the dignity of the Deity to create." Taking trees, then, in the alphabetical order of their common names, under the letter *a* occur the Abele, Alder, Apple, Ash, and Aspen.

The ABELE, or WHITE POPLAR (*Populus alba*), is thus the first of the poplar group, of which there will be more to say later on. It is a large tree, sometimes reaching 100 ft. in height, but more often not over 50 or 60, with spreading branches, and a smooth, grey bark to

the stem. It produces numerous suckers bearing large, deltoid, lobed leaves, 2 to 4 inches across, with toothed margins and green under surfaces. The bark of the young shoots is downy, and the buds cottony but not viscid. The leaves of the branches, which appear in March, are less tri-lobed, smaller, white and cottony on their under-surfaces, but becoming smooth as they get older, and suspended by long, slender stalks, which are laterally compressed, causing the leaves to hang obliquely, and thus to quiver in the slightest breeze.

It is from the hoary under-surface of the leaves that the Low Dutch name, *abeel*, or *abeelboome* (French *aubel* or *aubeau*) is derived ; and as we watch the shaking leaves we are reminded of the physiological importance of those organs, and of Mr. Herbert Spencer's suggestion as to the meaning of their movement. The leaf is covered with plant-mouths (stomata), and is also a combined lung and stomach. Not only does it take in useful gases, but within its cells these combine with the watery food that has ascended from the root. In order to bring this watery sap into the leaf, evaporation is constantly going on from its surface, and Mr. Spencer suggests that the swaying of bough and leaf gives the aid of an upward thrust to the circulating liquids. That evaporation may be unimpeded, leaves are spread out to the air on separate stalks, and in diverging directions ; and perhaps it is worthy of note that these long, flattened leaf-stalks occur in a group of trees remarkable for rapid growth and for their power of draining marshy ground by a wide-spreading system of roots, a spongy stem, and copious transpiration.

Like the rest of the willow tribe (*Salicaceæ*) to which it belongs, it has the sexes on different plants, or diœcious, so that in March and April, while some trees bear drooping catkins, often four inches long, of lobed scales, with clusters of vinous purple anthers, others have shorter and more erect assemblages of the less conspicuous female flowers. Many of both kinds fall victims, ere they have performed their function in the plant economy, to the gales of the spring equinox ; and after the pollen is discharged the ground is strewn with the now effete male catkins, whilst the fruiting capsules remain to fall in autumn with the leaves. The white leaves of this plant give it a cold and melancholy appearance as it grows in some marshy wood in dull weather, the effect of which is perhaps increased by their sighing and rustling in an evening breeze, when they may seem positively ghastly ; but when they glance in the sunshine, especially in the fitful gleams of a stormy day, the airy lightness of its mode of growth gives the tree a most cheering character. The twinkling of the silver plates seems to have a playfulness that is infectiously exhilarating ; so that, though its suckers render it undesirable in too close proximity to a lawn,

the white poplar may well find a place in marshy spots, where we can associate the thought of its mechanical effect in draining the soil with that of the health-giving alkaloid salicin which occurs in the bark of poplars as well as of willows, and which seems to be almost a specific for those rheumatic disorders that are suggested by such localities. (See POPLAR.)

The ALDER (*Alnus glutinosa*), though not unfrequently seen associated with the Abele is as different from it in beauty as it is in botanical characters. Though it may grow to a tree of considerable height, with a stem 2 ft. in diameter, it is usually of a bushy habit, with several stems, none of which exceed half that size, and it is in rounded clumps, among willows or isolated, by the banks of streams in our midland and northern counties, that its charms are chiefly revealed. Its rich masses of foliage overhanging beds of golden marsh-marigolds, or, later in the year, foamy banks of meadow-sweet, or the gorgeous magenta spikes of the loosestrife, have often called our attention to their beauty in such situations. The bark is, however, black, and there is nothing noticeable about the ascending branches, so that when leafless the tree is not attractive. Where it has been felled in autumn the live wood is white, but becomes red, as if with blood, where it is cut, and afterwards permanently of a pale pink. We may console ourselves even amidst the comparative absence of beauty in the leafless season of the year. If the grouping of the branches is not beautiful in itself, it is almost sure to appear so when the tracery of Nature's solid beamwork, and of her delicate lacework of twigs, is crystallized with hoar-frost; and when we see how our exotic evergreens suffer from the cold, and how the yew trees on the North Downs are bent towards the east by the westerly gales of autumn and winter, we can appreciate the provision of Nature by which the trees of colder temperate regions are, as a rule, deciduous. In the alder, as in the allied birch, the male and female catkins are on the same tree, and in the former they come out before the leaves, being often conspicuous among the dark branches in March, whilst the leaves do not appear till the end of April or the first half of May. The male catkins are from 2 in. to 4 in. long, and of a dark-red colour, from the shield-like scales which protect the pollen-bearing anthers from rain and premature winds; whilst those bearing the female flowers are seldom an inch in length, and resemble miniature fir-cones of a reddish-brown hue. When the small, winged fruits have been ripened and set free, the woody bracts hanging in a catkin on the bare boughs still more forcibly suggest this resemblance. It is for the gloss of its foliage, however, that the alder is most valuable. From the glutinous character of the hairy young leaves—glutinous and hairy that they may shoot the moisture when in the

bud—the plant derives its second scientific name of *glutinosa*. They remain hairy for some time whilst they may derive advantage from the dew, containing as it does traces of ammonia; but when their cells are choked with the waste products of their digestive processes the now darker leaves become smooth. At all times they somewhat resemble those of the beech, but are duller and darker in hue; in fact, the dark green of the tree and its compact growth in rounded masses render it sombre and heavy when the sun is not on it. There is a cut-leaved variety in Wigtonshire which gains considerably in lightness; but yet there is an undeniable charm belonging to the glossy clumps of the ordinary form when we see it overhanging some stream or pool in contrast to the blue-grey of the iris or the reed-mace, or to the gay flowers of water-crowfoot or arrowhead, where the dab-chick or the water-vole find a home among its roots, or a temporary shelter beneath its boughs.

G. S. BOULGER.

(To be continued.)

PROFITABLE PLANTING.

THE most profitable planting I have ever seen was in Kent, where a quantity of good strong land on chalk had yielded several cuttings of hop-poles. The kind of wood was chestnut, which makes the best of hop-poles, being a far tougher wood when young than oak of the same age. As the yield was remarkable I obtained the particulars from the agent of the estate (Lord Darnley's, at Cobham), and the figures may be relied on. The best chestnut underwood, cut by the buyer, sold at £63 per acre for hop-poles, the poles eleven years' growth, the underwood fifty years planted. Eleven years later the same piece sold at 42 guineas an acre, poles being cheaper.

The chestnut grows equally well on another well-timbered estate, that of Lord Egmont, at Cowdray Park, Sussex. The soil of the neighbourhood varies from sterile sand to good, warm, deep loam, and the latter is the land the chestnut loves. There are numerous plantations and underwoods of chestnut here; there are trees now containing two loads of timber each, which schoolboys could clasp around forty years ago, so rapidly have they grown; and, as if to show what the soil will do, there is a "Chestnut Race," or avenue in the park, almost a mile long, composed of noble trees with tall straight boles, tapering gradually instead of ending abruptly, as they do on unfavourable land, and measuring, breast high, 13 ft. and 14 ft. up to 17 ft. and 18 ft. girth. I believe the trees would measure 80 ft. and 90 ft. high, and that is tall for chestnuts. Writers sometimes over-estimate the height of trees. Some larches were reported lately

in a noted horticultural journal at 150 ft. high, and limes 200 ft. ! There are no such trees in the United Kingdom. The larch is not one of the tallest conifers, though taller than the Scotch fir. The celebrated specimens on the lawn at Dunkeld are less than 100 ft. in height. There are no other conifers in Britain so tall, probably, as the silver firs at Inverary, and Mr. Caie and myself estimated the tallest specimens at about 150 ft.

In measuring trees by the eye the judgment may be corrected by familiar comparisons. The Monument on Fish-street Hill, for example, is 202 ft. high ; St. Paul's Cathedral is 350 ft. ; Strasburg Cathedral, 444 ft. ; and the Pyramids a little higher. Most eyes are familiar with some of these objects, and can measure accordingly.

Not a tree in Britain would top the Monument. Are there any taller than 160 ft. or 170 ft. ? With the Pyramids in one's eye, how noble the Wellingtonias of the Mammoth Tree Grove must appear ! It is possible to realize in some degree their vast height by the method just suggested, even without beholding them. Think of a tree 450 ft. in height ! A foot for every day of the year, including Sundays (and a lot to spare for the tallest specimen), has brought them as near "heaven's gate" as any tree has reached, I believe.

The chestnut is not a profitable timber tree, being far less valuable than the oak, after about forty years' growth, owing to the twisting of the planks. As young wood it is invaluable for various purposes. The little town of Midhurst, outside Cowdray Park, is head-quarters for the industry of hoop-shaving, and hundreds of acres of underwood are bought yearly by the wood-dealers of the district. I received the following account of the preparation of the soil for a chestnut plantation from Mr. Francis Tallant, the Earl of Egmont's well-known agent. The cost includes the grubbing of the fir which preceded the chestnut. "The land to be planted has been recently cleared of Scotch fir. It is trenched two spits deep, stones and roots thrown out. The cost of the operation is about 2s. per rod, for which the stones partly repay. Early in November, the land is planted with three-year-old plants, at 3 ft. apart, for which holes are dug 18 in. square and 12 in. deep. The plants are worth 35s. to 40s. per 1,000, and 4,848 per acre will be required. The cost of digging holes varies from 9d. to 1s. per 100. The roots of chestnut suffer from the slightest frost, and care should be taken to protect all plants under removal." The after-cultivation consists in cutting down brambles or other rubbish to admit air and light in summer, and, at the end of the third year, cutting down the chestnut plants. The tree will then shoot vigorously and smother all rubbish, and will be ready for sale eight years afterwards. They will sell at about £10 per acre, and eight

years later the underwood will be worth £18 per acre. At the third cutting you should get at least £30 per acre. The cutting of the underwood every 8 years describes a rapid growth which can only be secured on suitable land which has been trenched. The plantation must be well looked after, dead stools replanted, and rabbits killed, since they are most destructive to chestnut, and will entirely ruin a valuable underwood if neglected."

The wood should also be well fenced and provided with roads, and the watercourses should be kept open where necessary. The best chestnut underwood of the Midhurst district is made into hoops for the London market, and the following list shows the usual prices of the hoops and the use to which the wood is applied:—

	Number in a Bundle.	Feet long.	Price per load of 30 bundles.
Middling ...	60	13	£6 12 6
Long pipe ...	60	12	5 2 6
Short pipe ...	60	11	2 15 0
Hoghead ...	90	9½	2 15 0
Kilderkin ...	120	7½	4 0 0
Firkin ...	180	6½	4 10 0
Long pink ...	240	5½	4 10 0
Short pink ...	240	4½	2 15 0
Tumbril ...	240	4	2 2 6
3-gal. bottle...	240	3½	2 15 0

Mr. Tallant has given further evidence on the value of chestnut underwood in an article on "Underwood," which appeared in the Journal of the Royal Agricultural Society, vol. xvi., second series. "Nine acres of chestnut were planted in 1835, and the plants cut down in 1840. Four sales of wood have since been made with the following results:—

1849, at 9 years' growth (sold by auction) at £14 10s. per acre.	
1858, ,, 9 ,, ,,	at £18 15s. ,,
1868, ,, 10 ,, ,,	at £35 11s. ,,
1876, ,, 8 ,, ,,	at £30 15s. ,,

This was underwood of superior quality. Within a circle of ten miles round Midhurst 1,500 acres of underwood are annually sold by auction. It is generally sold standing to working coppice-buyers, who convert it into hoops, hop-poles, faggots, &c."

The hoops and hop-poles of the heavier soils are the produce of oak and ash, the latter requiring better land than the former. The oak is, in fact, the wood of clay land, and will grow on the poorest; and as poor clays, which are unsuited for the production of grass or of roots, have been depreciated in value, and are hardly likely to recover their former value, with the price both of corn and of labour

running against them, they ought to be planted with suitable kinds of timber. This kind of land, it should be remembered, will grow timber and pay rent under that crop in proportion to its excellence. A case may be mentioned on high authority, where the sales of oak timber (not underwood) and bark ranged from £4,000 to £5,000 a year, for ten years, at from 2s. to 3s. per ft. for the timber, £6 to £9 per ton for the bark, and the trees varying from thirty years old to eighty. After paying every expense, the revenue derived from the oak plantation here referred to was double that of the finest arable land in the country.

You cannot, however, have good underwood and timber growing together, and, as a rule, the former pays best. Arthur Young gives some evidence on this subject, and on the growth and value of oak wood in his "Annals," which may be quoted, as prices were about the same then as now, and what the poor clays did then they will do now. The finest oak woods in Sussex were those of Lord Sheffield, which Arthur Young very much admired. Mr. Clutton, the agent, informed him that the timber of these woods paid 5s. per acre per annum; and as the rent of the country was 10s., the timber brought the woods to the same value as the arable land. According to Mr. Clutton, the common value of an oak of a hundred years' growth was £7. He had sold out of thirty acres of wood, the fee simple of which was not worth £200, a hundred trees for £1,000 and a hundred more for £400. But the trees had very much damaged the underwood, which sold at 40s. an acre at fourteen years' growth, before the trees were felled, and at £7 10s. afterwards. The underwood, therefore, had been injured to the extent of £5 10s. per acre in fourteen years, or nearly 8s. an acre.

The rent paid by the timber was 9s. per acre per annum, as we shall see if we divide the total produce of the trees, £1,400, by the number of acres on which it was produced (thirty), and divide the quotient (£46 13s.) by the number of years' growth, *i. e.*, a hundred years. But although the timber paid a rent of 9s. an acre, it injured the underwood to the extent of 8s. an acre.

In explanation of these results it should be added that the Duke of Richmond's prices for timber grown at Goodwood were, in 1793, as follows:—Ash 32s. to 37s. per load of 50 ft., oak 10d. to 3s. a foot, beech 25s. and 26s. a load. The timber was removed by the purchaser. Bark sold at a high price, £17 or £18 a ton at home. Goodwood is on the chalk, and the beech is its timber tree. The largest oaks measured two loads, the beeches measured more.

As to the profitable planting of the oak: in the Wealds of Sussex, Kent and Surrey, the oak is a self-sown plant, which is rarely planted since it springs up and soon covers uncultivated spots, as it does

some of the oak-covered mountain slopes of Wales. The broad hedgerows which divided the small fields sixty years ago and produced the famous ship-building timber, have disappeared, and the forest of the Weald is not so continuous as it once was.

Mr. Clutton, the eminent land agent, gave an account of oak timber to the value of £10,000 sold from a farm let at £100 a year; and in another case the farm let at £28 per year, and the timber upon it sold, in 1824, at £2,800. To a very great extent the hedgerows have been cleared, and the oak is now generally confined to coppices, one or more upon each farm producing both timber and underwood. The growth of each of these productions is very much promoted by the removal of the water by ditches twenty or thirty inches deep, cleared out at each cutting of the underwood.

The best oak timber is grown on clays, whether poor or rich. The tree will grow luxuriantly on gravelly soils, but the quality will prove indifferent, the oak being the wrong tree for the site. The oak is very sensitive to exposure. Its dislike to cutting winds is curiously displayed in that part of Sussex, between Battle and Hailsham, where the country is much exposed owing to the flat level of Pevensey Marsh and the near neighbourhood of the sea. Throughout this district, which is thus open to the prevailing south-west wind, the oaks are stunted, gnarled and unsaleable. Under such circumstances protection may be found in extensive planting. Meanwhile the best and fastest growing oak woods are found in sheltered situations.

The underwood of a young oak wood only becomes injurious when the trees reach a certain age. Suppose the whole of the timber to have been felled, the underwood is not found to injure the advancing tillers till after twenty years, or two cuttings, each worth from £8 to £10 per acre. It then becomes a struggle between the young trees and the underwood: the value of the latter at the next three cuttings suffers to the extent of about one-half, and the value of the subsequent cutting will not exceed £1 or £1 10s.

The underwoods are usually cut at intervals of from eight to twelve years, and at each cutting the crop of trees is thinned judiciously, the best being left and the inferior ones cut. Much of the profit of this branch of husbandry depends on the management. The self-sown tillers, saved at the outset for a future crop of trees, should be carefully selected, and marked with paint to prevent their being cut with the underwood. At the first cutting they will not be higher than the underwood, and will not need much thinning. Afterwards, at successive cuttings, they require careful thinning, leaving the ultimate crop say from 20 ft. to 30 ft. apart, according to the soil. The object is to keep them thick enough to draw each other up with clear stems of

20 ft. or 40 ft., and they must be thinned gradually, and not checked by the sudden admission of the wind. On an average of 100 years timber alone would not pay nearly so well as timber and under-wood mixed, on account of the loss in the earlier period, as already explained.

H. E.

"SHEEP-RUNS" IN ENGLAND.

ALL connected with land are having their minds exercised as to what is to be done with it, and certainly it is interesting to read the various views and opinions which find expression in the *Journal* as to how the question is to be dealt with, especially the article on "The Agricultural Depression, and How to Meet It," which runs over, I may say, the whole of the faults and shortcomings of both landlord and tenant; but much the same thing might have been written thirty years ago when the agriculture of England was at its best, and farmers advised to be chemists, geologists, &c., and adepts in all the sciences. Whether they took the advice given to them, and which has been dinned into their ears for a long time, or whether they turned a deaf ear to the teachings of the man of science, need not here be inquired into, as one thing is very evident, and it is that farming has 'seldom if ever been at so low an ebb as at present, for not only the man of business and the gentleman farmer, but the old and experienced agriculturist are obliged to succumb to the exigencies of the times, at the same time declaring that "all the talents" will not make farming pay; some few are still to be found who are bold enough to say that farming can be so conducted as to be remunerative, and are ready to instruct as to how this is to be done, but unfortunately capital does not seem to be forthcoming, consequently the advice cannot be put to the test.

The object of this paper is not, however, to suggest a panacea for all the evils, nor to point out the failings or the shortcomings of the farmer as such, but simply to notice some remarkable changes which are taking place in the mode of farming which I have observed in the course of a rather minute survey of Hampshire, and which is sufficiently indicated in the heading of this article. A tract of land some 3,000 acres in extent and nearly contiguous, consisting of six farms with good houses and homesteads and labourers' cottages, hitherto mostly arable, and farmed on the four-course shift, the soil not deep, incumbent on the chalk, described as good sheep and barley land, and has produced its 10 sacks of wheat to the acre, rent including tithe 18s. to 25s. per acre. These farms are now in

process of being thrown into grass for "sheep-runs," the only exception being about 60 acres reserved as ploughing land to each farm, or about one-ninth of the acreage. The *modus operandi* is by turning the fallows with grass seeds without any extra cleaning, and flinging the other parts into pasture. The "runs" are as large as can be got (200 to 300 acres), being bounded only by existing roads or other properties, and surrounded by a high bank with a one-rail fence on the top, where a certain number of sheep (one to an acre) are supposed to derive their entire support, summer and winter, without any extra food whatever. The breed of sheep selected is the cheviot. I have now described with sufficient accuracy what may be facetiously called the "dog and crook" style of farming, and do not propose to inquire into, or express an opinion as to whether this system will pay the farmer, but only to glance at some of the results consequent on such a radical change, and the first thing to be noticed is the great reduction that will take place in the manual labour account, which will be reduced to about one-fourth: the shepherd will be the principal man on the labour list, but indeed the farmer may perform this duty himself with only his "dog and crook," and two or three labourers at the most will be sufficient for a 500 acre farm. The present number of cottages will therefore not be required, and the labourer will have to migrate, or emigrate, according to opportunities afforded him; also the number of farm buildings will not be required, and therefore need not be kept in repair, this will reduce the bricklayer and carpenter's bill, as well as other cognate trades, but it will affect the village blacksmith most, no ploughs, harrows, &c., to speak of will need repair, and to parody Longfellow it will be:

Beneath the spreading elm tree,
The village smithy stands:
With *Mr. Smith* it's all U. P.
He's gone to other lands.

The village shopkeeper will also be greatly affected by the change, and—hear it, *Sir Wilfrid*, and rejoice—the beershop will disappear. The schoolmaster may as well literally *go abroad*, for the rising generation will not be: in short, all trades or callings which depend on a rural population will suffer more or less as the case may be.

The reduction in capital required will be great, as the sum necessary to farm 3,000 acres on the four-course shift cannot be put at much less than £30,000, but by a return to pastoral farming the capital required may be put at one-third, or £10,000; this will be an advantage in so far that many a man could be found ready to take a 500 acre farm requiring say £1,500 capital, whilst it is difficult to find one with £5,000 to do so.

The reduction in produce will of course be considerable, but principally in corn and hay as we will assume that the same number of sheep is raised under both systems. The decrease in the yield of wheat will be from 4,500 sacks to 900, barley or oats from 3,750 qrs. to 750, and hay from 1,120 tons to 220. This decrease will represent a large sum of money. The decrease in pigs and poultry will be considerable, but it would be difficult to give even an approximation as to this. Such are some of the changes which will inevitably follow the adoption of pastoral farming. The labourers gone and their cottages unoccupied, the farm buildings unnecessary and going to ruin, the village tradesman and shopkeeper's business extinct, will all present a picture of desolation, and when we add to this the great reduction in the produce of the land, the political economist, the patriot, and the philanthropist will unhesitatingly condemn it.

On the other hand, is it incumbent on the landowner to conduct his business for the good of the country and to his own loss? if so, no other trade or calling is supposed to do it? Or is the farmer to be any longer sneered at by those who are bold enough to say that his business will pay if conducted on such and such principles, while at the same time the capitalist buttons up his breeches pockets and coolly walks away, leaving him to meet his engagements as best he may?

I have to note another farm being altered, which, although the change is not so great as those described? still tends in the same direction, and as it does not involve such a revolution may commend itself more to the notice of the agriculturist. This farm consists of 650 acres, the quality of the land being much the same as the others, and has been farmed on the same principles; it includes 50 acres of down or almost primeval pasture, and the rotation for the present year is as follows:—

Old ley	...	...	...	...	...	...	...	...	...	72	
Grass seeds	...	...	...	...	...	...	...	...	...	58	
Turnips, including rye and vetches as catch crops	...	...	...	...	...	...	...	...	...	70	
Wheat	...	...	...	...	...	...	...	...	...	30	
Rye	...	...	...	...	...	...	...	...	...	23	
Barley and Oats	...	...	...	...	...	...	...	...	...	64	
										—	317
Plunged out of cultivation in the shape of permanent pasture	...	...	...	...	...	...	...	...	...	283	
Down	...	...	...	...	...	...	...	...	...	50	
											650

JNO. SMITH.

TREE PRUNING

*Translated from the French of A. des Cars, by Charles S. Sargent,
Professor of Arboriculture in Harvard College, U.S.*

(Concluded from page 650.)

BARK once injured or loosened can never attach itself again to the trunk ; and whenever wounds, abrasures, or sections of loose bark exist on the trunk of a tree, the damaged part should be cut away cleanly as far as the injury extends. Careful persons have been known to nail on to a tree a piece of loosened bark, in the hope of inducing it to grow again, or at least of retaining on the young wood its natural covering. Unfortunately the result produced by this operation is exactly opposite to that intended. The decaying wood and bark attract thousands of insects, which find here safe shelter and abundant food ; and, increasing rapidly, hasten the death of the tree.

In such cases, instead of re-fastening the loosened bark to the tree, it should be entirely cut away, care being taken to give the cut a

regular outline, especially on the lower side ; for, as has been already explained, if a portion of the bark (A, Fig. 49), even if adhering to the wood, is left without direct communication with the leaves, it must die and decay. A coating of coal-tar should, of course, be applied to such wounds.

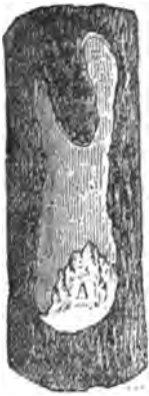


Fig. 49.

Loosened Bark.—It is necessary to frequently examine the lower portions of the trunk, especially of trees beginning to grow old ; for here is often found the cause of death in many trees, in the large sheets of bark entirely separated from the trunk. This condition of things, which often cannot be detected except by the hollow sound produced by striking the trunk with the back of the iron pruning knife, arrests the circulation of sap, while the cavity between the bark and the wood furnishes a safe retreat for a multitude of insects, which hasten the destruction of the tree. The dead bark should be entirely removed, even should it be necessary in so doing to make large wounds. Attention, too, should be given to injuries to the bark caused by the fall of neighbouring trees. These may remain hidden for years, and are often only detected by the peculiar sound produced by a blow of the pruning knife. Cases of this nature require the treatment recommended for the last class.

Cavities in the trunk.—Very often when a tree has been long neglected, the trunk is seriously injured by cavities caused by the decay of dead or broken branches. It is not claimed that pruning can remove defects of this nature : it can with proper application,

however, arrest the progress of the evil, and in such cases should always be resorted to. The edge of the cavity should be cut smooth and even, and all decomposed matter, or growth of new bark formed in the interior, should be carefully removed. A coating of coal-tar should be applied to the surface of the cavity, and the mouth plugged with a piece of well-seasoned oak, securely driven into place. The end of the plug should then be carefully pared smooth and covered with coal-tar, precisely as if the stump of a branch were under treatment. If the cavity is too large to be closed in this manner, a piece of thoroughly seasoned oak-board, carefully fitted to it, may be securely nailed into the opening, and then covered with coal-tar. It is often advisable to guard against the attacks of insects by nailing a piece of zinc or other metal over the board, in such a way that the growth of the new wood will in time completely cover it.

These operations resemble, if such a comparison is admissible, the fillings performed by dentists, and with the same object, to check the progress of decay.

A glance at Fig. 50 shows what takes place when cavities in the trunks of trees are treated in the manner recommended. On the right a cavity treated in this manner is shown. New layers of healthy straight-grained wood have already formed, the circulation of sap is regular and healthy, and the tree is entirely restored to health. On the left an old neglected wound may be seen. These instructions are equally applicable to the treatment of large wounds caused by the fall of branches broken by the wind, or by any other cause (Fig. 4).

Removal of Shoots.—During the spring following the operation of pruning, or even sooner if the tree has been pruned during the active flow of sap, numerous shoots are developed along the trunk, and especially along the lower portion of the branches. The number of such shoots varies greatly in different trees; and although they are not entirely the result of pruning (for such shoots appear on trees which have never been pruned), still it is clear that their number and vigour bear a certain relation to the number and size of the branches removed in pruning, and that the more severely a tree is pruned, the more of these shoots it will develop.

The removal of these lateral shoots is essential to a healthy growth of the tree, and may be easily accomplished with a little pruning hook (Fig. 51), so light that it can

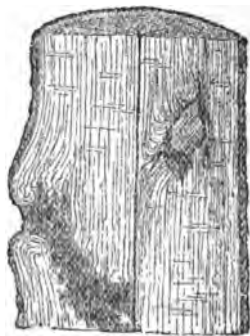


Fig. 50.—On the right an old cavity properly treated and stopped; and re-covered at the end of twenty years with sound straight-grained wood. On the left a wound of the same sort abandoned and causing decay to penetrate to the heart of the tree.

be used by a child if necessary. The sharp blade is worked up and down in the direction of the grain of the wood; the little hook rounded at the end is also sharpened, and can be used in cutting and pulling down shoots not entirely severed by the blade.

The following method may be adopted in removing these young shoots. When the second or August growth of the tree is finished, and the young shoots are still soft and tender, that is in August and September, a workman armed with two pruning hooks, fastened on long tough handles of different lengths, and carrying his pruning knife in his belt, commences the operation by cutting off all the shoots within reach of his knife.



Fig. 51.—
Pruning
hook.

This is continued first with the short and then with the long-handled pruning hook, with which he will be able to reach to the top of the trunk of an ordinary-sized tree. In the case of very tall trees it will, of course, be necessary to use a ladder; and, although this will make the removal of the shoots a longer and more expensive operation, it should not on this account be neglected. The presence of a few shoots along the upper part of the trunk of a large tree does not materially interfere with its growth; their proximity to large branches, by which they are necessarily shaded and overtopped, checks their growth and prevents any great injury to the tree. As a general rule, however, all such shoots developed on the trunk below the branches should be removed, except from very young trees, insufficiently supplied with foliage, or when less than one-third of their height is regularly furnished with branches. In such cases several shoots should be left to supply the place of branches and to regulate the flow of sap (Fig. 52).



Fig. 52.—Pre-
servation of
shoots on the
stem of a young
tree destitute
of sufficient
branches.

It is often desirable to make two operations of lopping these shoots. Those on the lower portion of the trunk may be cut during the first half of July; while those higher up on the tree may be left until September, to aid the flow of sap and hasten the healing of the wounds made in removing those first cut.

The removal of these shoots is one of the most important operations connected with scientific pruning, and it should be carefully performed as long as they continue to appear, that is during two or three or at most four years, if the tree was skilfully pruned at first.

Season for Pruning.—The most favourable season of the year for pruning is the autumn, when the days are still long and pleasant. The sudden and severe frosts, however, which often occur at this season of the year, are dangerous, and in some instances have a tendency to cause decay in freshly-made wounds. In winter the days are too short, and often too stormy, to allow continuous work of this nature; while the loss of sap which occurs when trees are pruned in the spring, although considerably checked by the use of coal-tar, is probably rightly considered injurious. The leaves interfere with pruning during the summer months, when, too, there is danger of the workmen inflicting injury on the growing tender shoots of neighbouring trees; but a tree may be pruned at any season of the year, and the best time for pruning is that which is most convenient, and when it can be most cheaply performed.

All trees, whatever the nature of the soil in which they grow, may be advantageously and profitably pruned, with the exception, perhaps, of trees growing on very poor and barren soil. These, as a general rule, can produce nothing more valuable than fuel, and hardly justify the cost and labour of pruning.

The Use of Coal-tar.—Coal-tar, a waste product of gas works, is a dark-brown imperishable substance with the odour of creosote. It can be applied with an ordinary painter's brush, and may be used cold, except in very cold weather, when it should be slightly warmed before application. Coal-tar has remarkable preservative properties, and may be used with equal advantage on living and dead wood. A single application without penetrating deeper than ordinary paint forms an impervious coating to the wood cells, which would without such covering, under external influences, soon become channels of decay. This simple application then produces a sort of instantaneous cauterization, and preserves from decay wounds caused either in pruning or by accident. The odour of coal-tar drives away insects, or prevents them, by complete adherence to the wood, from injuring it. After long and expensive experiments, the director of the parks of the city of Paris finally, in 1863, adopted coal-tar in preference to other preparations used for covering tree wounds, as may be seen in all the principal streets of the capital.

Objections to other Preparations.—Efforts have been made for a long time to discover some method of covering the wounds inflicted on trees, either accidentally or by the hands of man. The remedy usually recommended from time immemorial is the ointment of St. Fiacre, a mixture of loam and cowdung. Various preparations, too, used in grafting, and having resin, wax, and grease as their basis, have at different times been very generally recommended for this purpose. These preparations are expensive; and, as they must be

applied hot, it is not practicable to use them on a large scale. Their use, too, is attended with serious difficulties. As the new growth of wood spreads over the wound, these thick coatings are either broken or pushed aside bodily, according to the power of resistance of the material used ; and the wood is again exposed and a safe retreat for injurious insects prepared.

One coat of coal-tar is sufficient for wounds of ordinary size ; but when they are exceptionally large a second coat may, after a few years, be well applied. In warm countries, like the South of France, the great heat of summer renders coal-tar so liquid that it is often impossible to properly treat wounds made at that season. In such cases another coat should be applied during the following winter.

Effects of Coal-tar on the Elm.—The effect of coal-tar on the elm is not always as satisfactory as upon other forest trees, such as the oak, ash, sycamore, birch, maple, &c. The application of a coat of coal-tar on all of these gives at once to the wound a hard, firm surface ; on the elm, however, it does not always adhere firmly, owing to the formation on the surface of the wound of the water blisters common to this tree. In such cases the coal-tar which does not adhere firmly should be rubbed off and another coat applied to the wound.

Employment of Coal-tar in protecting Young Plantations against Animals.—Coal-tar may be used with excellent effect in protecting young plantations from the attacks of rabbits and other game, or such domestic animals as goats and sheep. Satisfactory results have been obtained, too, from the use of coal-tar in protecting young trees from horses, which often take special delight in tearing off the entire bark from certain kinds of trees, particularly elms and poplars. This is not, however, always a safe or desirable remedy, as it necessitates covering a large part of the stem, and this is often fatal to the tree, either by producing asphyxia, from which trees treated in this manner are liable to suffer, or, perhaps, by the action of the powerful acid contained in coal-tar itself, which, used in large quantities, might perhaps affect the sap.

Employment of Coal-tar on Fruit Trees.—It is for this reason that the application of coal-tar should not be made except with considerable caution in the treatment of wounds on drupaceous fruit trees (cherries, peaches, plums, &c.), and especially on the plum tree. It has often been observed that the bark of fruit trees of this class have suffered from the application of coal-tar. This is not the case, however, with pome-bearing trees (apples, pears, &c.) ; to these coal-tar may be applied with perfect safety.

It must not be supposed from these remarks that coal-tar cannot be used on the plum or other trees of its class. On the contrary, there is no substance which can replace it in the treatment of large

wounds on these trees, but it should be used cautiously, especially in the case of young trees, and should not be allowed to needlessly run down the trunk; and it is well to remember that the more active a remedy, the greater the care necessary in its application.

Soft Woods.—Woods with little density or strength are called “soft woods” or “white woods,” in distinction from hard woods, such as oak, elm, ash, &c. Such woods are easy to work and in great demand for many purposes. The trees yielding wood of this sort grow often three or four times as rapidly as hard-wood trees, and are therefore more profitable to cultivate. To this class belong many trees with deciduous foliage, such as the poplars, willows, lindens, &c., and most conifers. The general rules for pruning are applicable to trees of this class, and it is only necessary to say a few words in regard to the treatment proper for poplars and conifers.

Poplars.—The poplars, owing to their rapid growth and the excellent quality of the wood yielded by them, constitute a group of considerable interest. The growth of these trees is often so rapid that it is practicable to make the length of their trunks equal one-third to one-half of the entire height of the tree, and thus greatly increase their value for industrial purposes. The large branches of trees of this family are very brittle, and are easily broken by wind or ice, and should be shortened in the manner already explained for hard-wood trees.

Conifers.—These trees, which are generally gregarious and form extensive forests, are valuable subjects for Sylviculture, on account of the readiness with which they reproduce themselves from seed, and because they admirably prepare the soil to produce hard woods, and especially the oak. Of the two operations of pruning—the cutting close to the trunk and the shortening of branches—the second need not often be applied to the natural pyramidal form of firs and spruces; for these trees nothing is necessary beyond removing, when possible, dead or dying branches.

The pines, however, when not growing under the conditions peculiar to them, that is crowded together, often develop enormous branches, which greatly interfere with the beauty and the value of the trunk, the only portion of the tree possessed of any value. The rules laid down for shortening the branches of oaks and other deciduous trees are, in case of necessity, applicable to pines; that is, one-third or one-half of the length of the branches may be safely cut away. It is essential, however, to preserve at the end of the shortened branches an abundant supply of foliage, as the branch of a coniferous tree deprived of leaves is more certain to perish than the branch of a deciduous tree under similar circumstances. A pine may in this way be made to assume the natural form it would have had

if grown under normal conditions ; the trunk lengthens and thickens regularly, giving to the tree an economic value for many purposes of construction, and especially for the masts and spars of vessels.

As a pine grows, the lower branches die and dry up. The resin with which these are impregnated prevents their decay ; and these dead branches, embedded in the new wood, form the knots which interfere with the growth of the tree and produce holes in the boards and planks cut from it. Such defects can be greatly diminished by cutting off all dead or dying branches close to the trunk ; while a coat of coal-tar will prevent or reduce the flow of resin from the wound.

The practice of leaving a short stump to an amputated branch, adopted by some persons to prevent the loss of sap, although less objectionable in the case of coniferous trees, should never be adopted. Such stumps must be cut again the following year close to the trunk, or cushions of wood will form about their base, covering the trunk with protuberances (Fig. 53). These greatly injure the appearance and value of the tree, and necessitate, should it be found desirable to remove later such excrescences, wounds two or three times as large as an original cut close to the trunk would have made.



Fig. 53.—Effect on the pines of leaving the stump of an amputated branch.

The custom of pruning pines is very general in France, and is often carried to excess. The removal of all branches, with the exception of a few at the top of the tree, must greatly interfere with the growth in diameter of the trunk ; and healthy branches should not be removed for the sake of creating a clean trunk of more than one-half or at the most two-thirds of the entire height of the tree. The general rule of pruning already explained in the case of deciduous trees, and which establishes a proportion between the number of branches which should be removed and the size of the tree, might with advantage be more generally applied in the treatment of pines.

THE USES OF CHARCOAL.

IN conjunction with the manufacture of charcoal, it may not be deemed unnecessary to record a few of the many uses to which it is applied, more especially as the consumption for estate purposes, in an agricultural and horticultural line, is very considerable. The making of charcoal for domestic purposes, and probably also for such

manufacturing processes as the ancients were acquainted with, is of high antiquity.

The primary and perhaps principal use of charcoal is for combustion, for which purpose it is manufactured by many private persons, being found not only cleaner to use but also productive of greater and more lasting heat than most other combustible matter, and therefore of inestimable use in the kitchen for cooking purposes. In the making of gunpowder the consumption of charcoal is also very great; in this case preference is, however, given to that produced from certain kinds of wood. It is of frequent use in the garden for potting purposes, vine borders, flower beds, &c., and in the transmission of bulbs to a distance, nothing is better for packing than charcoal dust.

Charcoal is used medicinally both internally and externally, its antiseptic and vital qualities being highly valued in many kinds of fever. Tainted meat surrounded with it is restored to a condition fit for use, and foul water filtered through charcoal is purified.

It is very porous, and absorbs gases and moisture rapidly—nearly 100 inches of gaseous ammonia being absorbed by a cubic inch of fresh charcoal. It is a good disinfectant, and when strewn over the remains of dead animals prevents any unpleasant odour arising therefrom. It is not soluble in water, nor fusible by any degree of heat however great.

Charcoal, principally animal (procured by burning bones), possesses the power of destroying the colour, smell, and taste of a great variety of vegetable and animal substances. It is largely used for this purpose in sugar refining. Charcoal is tasteless, inodorous, lighter than water, and full of pores. In its common state it is one of the worst conductors of heat known, but its power is increased after being strongly heated. During the combustion of charcoal, carbonic acid is formed by the union of the oxygen of the air with carbon, and in its gaseous state acts upon the human system as a powerful sedative poison.

ANGUS D. WEBSTER.

THE CAPABILITIES OF THE WEYMOUTH PINE.*

A COMMITTEE was appointed by the late Forest Congress at Hanover to consult and propose themes for the sitting of the German Forest Congress, which will be held this year at Coburg. For the department of sylviculture the subject they have chosen for discussion is the behaviour of the Weymouth pine (*Pinus Strobus*). It being desired to obtain a well-grounded opinion on this subject, foresters are

* Translated from the *Forst und Jagd Zeitung* for October.

thus early invited to employ every opportunity which offers for observation. Dimensions, yearly increase, &c., should be measured, and communicated in a forestry periodical, or at the Congress. The fellings of this winter may afford suitable material in many quarters for measurements of cubic contents, for determining factors of shape, and for examining the technical qualities of Weymouth pine timber.

It is a fact that Weymouth pines frequently die off between the ages of 15 and 25 years. Information as to particulars, extent, and cause of this phenomenon are much to be desired.

The chief sylvicultural qualities of the Weymouth pine appear in its rapid growth from the earliest youth, in its resulting rapid production of timber, in its copious shower of spines, and in its comparatively patient endurance of shade. The last-mentioned property is particularly valuable, where, among conifers of 30 to 40 years of age, there are either small defects from wind or snow breakage, or narrow, discontinued roads to be speedily filled up.

The Weymouth pine generally continues to grow energetically upwards, even when considerably pressed upon from the side, under circumstances where the common pine refuses its services. Up to the present time the technical qualities of Weymouth pine timber remain doubtful. It appears to gain very decidedly in quality with years of growth, and it seems as if the unfavourable opinions, which in several cases have been proclaimed, arose from observation of timber which had been cut down before maturity.

In estimating a species of wood we must always distinguish between the behaviour of the single tree—whether in the open or mixed singly among other woods—and the behaviour of the same species of wood when massed together in compartments in a forest.

In the latter condition the Weymouth pine shows great capability. For example, in the ducal forest district of Wendhausen, near Brunswick, there are parcels of Weymouth pine of some extent, which should satisfy the most exacting. These coverts, examined by means of specimen portions of rather large area, in the 38th year, give an average growth of 12 cubic metres per hectare. One compartment contained per hectare 1,560 poles of *Pinus strobus*, 52 poles of *Pinus sylvestris* of an average diameter of 19 centimetres, with a height of 15·6 metres. The total area of sections of trunks at four feet from the ground is 45·78 square metres per hectare, and the solid contents 439 cubic metres.

To incite to the collection of particulars from other districts is the object of these lines.

NOTE.—The above figures adapted to English measures are as follows per acre :—652 poles per acre, that is 631 Weymouth, 21 common pine; average diameter 7·5 in., and height 51·2 ft. The total area of sections

of trunks at four feet above ground would be 199 square ft. per acre, and the solid contents 6,272 cubic ft. per acre. The factor of shape calculated from the solid contents is 0.615; that means that an average pole is equal to a cylinder 51 ft. long and $7\frac{1}{2}$ in. thick, multiplied by 0.615. The factor of shape of any tree expresses the proportion between it and a cylinder.

GRAFTING FOR ORNAMENTAL EFFECT.

IN addition to merely remunerative motives, which actuate alike men of every grade of society, there are other motives which must be scarcely less weighty with those to whom these observations are principally directed, who, it might be justly calculated, are well qualified, both by education and cultivated taste, to appreciate the grandeur of forest scenery and sylvan decoration, which is so inseparably connected with a gentleman's country seat. But our ideas of such things are often in strict antagonism with the real state of matters; for how many instances might not be advanced where lawns, carriage drives, and terraces could be improved and rendered highly attractive by the conversion of some of the common species of trees into plants of neat and attractive outline and alluring foliage?

By having recourse to the practice of grafting we may convert common and unattractive specimens of trees into plants which furnish masses of flowers, either in the early spring months or later in the year; and when to these flowers are added the varied tints assumed by the foliage of the different species, especially in spring and autumn, it will be evident that such trees are invaluable for brightening up masses of evergreens. Take, for example, a grafted specimen of variegated ash-leaved maple (*Acer negundo variegatum*): what could be more strikingly beautiful or more remarkably effective than this when growing intermixed with dark-coloured evergreens? It is also equally attractive when grown in masses on the lawns or shrubberies.

The process of grafting may be applied to nearly all forest trees and shrubs, from the sapling in the nursery to the tree of saleable dimensions, provided that it be done at the proper season, and sufficient care be taken in the execution of the work. There is no mystery about the operation, and it can therefore be practised by any careful person; it simply consists in the joining of a shoot of one variety to that of another, in a proper manner.

At one time it was considered that a graft would succeed upon any variety of stock, but this theory has long been laid aside as incorrect, and we have only to consider the matter from a physiological point of view to see the fallacy of it. The stock and the graft

must be identical in regard to the periods of the movements of the sap, the falling of the leaves, and the maturing of the fruit and timber; and, unless these considerations be carefully observed, anything like success can never be realized: they may for a time appear to succeed, but will ultimately dwindle off and die, leaving the operator little credit for his work, besides in a certain degree injuring the stock for further grafting.

The principal object to be kept in view in grafting is to properly unite the liber, or inner bark, of the graft with the inner bark of the stock, and keep them together until they are perfectly united, which in most instances will occur in about three months from the time of grafting.

There are various modes adopted in grafting, but I consider the crown-grafting the best system that can be adopted when applied to forest trees, and more especially when the trees operated upon are of ordinarily large dimensions. It can be very successfully practised upon thick stocks of headed-down trees, and in this case it is accomplished in the following way:—first cut off the head of stock, horizontally if preferred, taking care to have the surface of the stock quite smooth; then cut one side of the graft flat and sloping, from an inch to an inch and a half long, leaving a sort of a bulge at the top of the cut to rest on the crown of the stock; then make an incision in the bark to the required length, raising it carefully up with the handle of a budding knife, so as to admit the scion between it and the wood, place the scion with the cut side next the wood, putting it far enough down for the shoulder to rest on the head of the stock; when this has been completed the graft may be firmly bound up with a string of matting and carefully covered over with clay to the thickness of about an inch and a half, seeing that it be effectually closed to prevent the light or weather from penetrating.

Grafting may be commenced in spring immediately before the sap has commenced its circulation, but it must be observed that the grafts should be cut some weeks before they are put on, as it is necessary that the sap of the stock should be in brisker motion than that of the scion, and its vegetation more advanced. The clay used may be either yellow or blue, and well beat up, with about a fourth of horse-dung mixed in it. It should be allowed to remain on the tree until about the latter end of July or the 1st of August, at which time the grafts may be gradually relieved of their tyings, and, if need be, carefully supported, to prevent them against injury from the action of violent winds.

J. T. McLAREN,

Assistant Forester.

THE SPRUCE-GALL APHIS (Adelges abietis).

OF the many insects which attack and produce galls on our forest trees and shrubs, the *Adelges abietis*, or spruce-gall "flies," as they are commonly called, are among the most interesting.

In the early spring months, when vegetation is just beginning to awaken from its apparent rest, on the first unfolding of the bud, these female flies, or aphides, will be found congregated around the base of the buds, which they soon begin to sting or puncture, thereby causing an irritation in the young shoot, which afterwards becomes diseased and distorted, forming the well-known "pineapple" gall, of which many are seen lying about in spruce plantations in the autumn months. After the female aphis stings the bud she goes on laying her eggs in a mass all around her, their number amounting to between 120 and 200. Each egg is fastened at the base by a fine silken thread. She covers the eggs with a fine downlike substance from her own body, and then dies.

Meanwhile at the base of the short leaves there is a cavity formed, which gradually becomes closer as the leaves and gall develop themselves. The young brood will be hatched and moving about by the end of April or beginning of May, as the season is favourable or adverse to their development.

These young aphides spread themselves over the cone, or gall, and gradually disappear into the cavities of the gall, which is naturally intended for their development, as is clearly shown in Miss Ormerod's new work on "Injurious Insects."

Many different opinions exist as to the nature of these galls and the aphides, some considering that the galls contain the eggs of the flies from the time they were laid till hatched. I was of the same opinion until upon further investigation I found that the eggs are laid at the base of the buds, while the galls are intended for their nourishment while in their young state. These galls soon fully develop, the leaves become stiff, and the gall quickly hardens, the cells of which split open and the young brood appears, dispersing themselves over the branches, when they attain wings and fly away.

The females of the brood soon take to the shoots of other or the same tree, and commence the same operation as did the parent female insect, only the cones of the first brood will be found mostly on the under part of the trees, while the second brood choose the shoots near the tops of the trees. The cause of this is obvious. The shoots will be fresher and contain more sap; also, being further developed, the cones will appear for the most part about the middle of the shoots. These females of the second brood only lay from twenty to forty eggs, and the young which hatch from this brood live through the

winter, and are the aphides which make the attacks on the trees in the following spring. They may be found hybernating among the moss, grass, or other rubbish, emerging in spring as the warm sun awakens them.

From the fact of these parasites being almost universal on the young plants as well as the mature tree, the contorted and puny, as well as the strong and robust, there can be little done as a preventive remedy against such attacks. In the case of young plants about the lawn and policies, where their presence is objectionable, the galls could be gathered in early summer and burnt. Of course, the effect of this would be the destruction of the insects. The cutting off of the shoots from the young plants might prove as bad as the attack, but young plants successively attacked by these insects will soon become sickly, lose their leaves and eventually die. In older or matured spruce the galls (empty), which are found lying under the trees in autumn, prove how destructive these parasites are. I find that severe winters have no effect in lessening their numbers. I do not think any effectual remedy can be applied to old woods, but in them the aphides must be left to their natural enemies, such as ladybirds, ichneumon flies, insectivorous birds, and the like.

ROBERT COUPAR.

NUNUPTON OAK.

ON the summit of Brimfield Hill, Herefordshire, there is now lying the remains of a prostrate monarch of the forest, yclept "Nunupton Oak." This noble tree was unfortunately burnt down in 1851 by a rustic who had availed himself of its shelter for a night's lodging, and on leaving threw the match with which he had lighted his pipe amongst the leaves on which he had slept; the flame from these leaves ignited the decayed wood inside the tree; the fire raged with such fury, that in that isolated spot, no means could be obtained to extinguish it. Some sturdy labourers coming to their work at 6 a.m. cut it down, and by dint of judicious application of some wet manure from a farm-yard near at hand, and a few buckets of water, they were able to subdue the raging element. When the Sydenham Palace Company had erected the shell of the Californian giant in the Central Transept, the proprietor of the Nunupton Estate directed the writer to try to get this noble specimen of English produce also within that building, but the great expense of cutting this tree into sections and re-erecting was too much for the funds of the Company. Consequently Nunupton Oak is gradually diminishing with the action of summer heats and winter storms. Some 18 years ago a gentleman

who had seen this tree whilst on a visit in this district, wrote an interesting account of it to a local paper, and at the same time invited some information respecting its age. Having taken great interest in this subject from my boyhood, I at once took some steps to ascertain the measurements, which were as follows :—length of trunk 70 ft., diameter of the butt cut off twelve inches above the ground, 14 ft., circumference eight feet from the ground 32 ft. Basing a calculation on these measurements, I estimated the age at from 1,000 to 1,100 years. As a proof of the growth of the tree at this extreme age, the aperture through which persons used to enter was gradually closing, so that an average-sized man could scarcely get through, and I have no doubt that but for this unfortunate destruction it would have been necessary to cut away a portion of the wood to allow any one to enter. Some idea of the great size of the tree may be formed by the fact that two tall men mounted on high horses could not see each other over the trunk, as it lies on the ground, although 30 years' exposure to the elements has materially lessened it. Of course all the bark, which was 4 in. thick, is gone, the sap too has perished, and the Englishman's propensity for carrying away relics has also been exercised very freely. Consequently a few more years will suffice to render this interesting object unworthy of further preservation.

A. MAINWARING.

SURFACE DRAINAGE.

MANY people look upon draining as a mere mechanical labour. The farmer lines off his drains equidistant apart, opens them to a certain depth from the surface, lays into the bottom stones or pipes, returns the clay, and considers his field drained. After a few years he finds the field is still clammy and wet, but consoles himself by vouching to his neighbour the information that he has spent no end of money trying to render the field dry. Knowing that there is nothing enigmatical in the art of draining, he tries to remedy the evil, spends more money, but only to find the result of his labour most unsatisfactory. Why? Because he did not at the first set out and inquire accurately into the cause of the wetness. If, for instance, the soil was a heavy clay or loam resting on a hard "pan" or an adhesive stratum of clay, which after a couple of years or so became quite impervious to water, the subsoiling plough ought to have been put into force and the injurious "pan" broken up. A field may be wet owing to its location, being situated near a treacherous subsoil from which water is continually oozing out and stagnating in the soil. Hue-head or catch-water drains are necessary to intercept the moisture before it spreads over the field. Sometimes the redun-

dancy of water is occasioned by bottom springs, and these should all be tapped at the fountain. Obviously if the drainer before commencing operations search for a cause, very probably he will render his work effective at one-half the outlay which it will otherwise cost by going blindly to work. Draining is very costly, and great prudence ought to be exercised in laying out the money, and if this is done, no undertaking is more productive of good results. The benefits of good drainage are numerous. The land is more easily worked, and in spring may be ploughed weeks before undrained land. This in itself is not only a saving of time but also a saving of money. Every farmer is aware of the advantage of having his seed committed to the soil in proper season. Then again, when seasons are awkward such as the past two or three summers, the quick passage of water through the soil does not injure the crops. After heavy rain the surplus water speedily sinks away down through the soil, taking with it and leaving just where they will do most good, ammonia, carbonic acid, and all the other ingredients which tend to enrich the earth and make it fruitful. Obnoxious plants disappear, and the ground becomes free from germs of fatal pest among live stock. Foot rot, liver rot, and all the various diseases known by the name of "rot" among sheep and cattle are often the direct result of inattention to a proper system of thorough drainage.

D. SYM SCOTT.



THE HOME FARM IN FEBRUARY.

ARABLE LANDS.—Complete the ploughing of stubbles as soon as possible, and get in corn crops. Finish up *wheat* planting, and get in *oats*. Also drill *peas* of hardy kinds now, and other sorts later on. The Tartarean oat is a heavy cropper and well adapted to putting in at this season. Put in *beans* upon a firm furrow, and with land in good heart or well manured. Upon foul land give from 20 to 24 inches between the rows, to admit of horse-hoeing and weeding. *Parsnips* may be sown upon good loamy land after the middle of the month. A deep furrow should have been ploughed early. Roll down the land if dry enough; sow, or rather drill at 12 inches apart, 5 or 6 lbs. of seed per acre, and harrow in lightly.

Live Stock.—In dry weather horses will be busy getting on and ploughing in manure, getting in corn crops, and ploughing up close behind the sheepfolds. Feeding cattle should be liberally treated. Preparation should at once be made for the lambing season. In wet weather, or while eating turnips, supply the ewes with an abundance of dry food. Cut turnips, with some peas, oats, and oilcake, will be

good feed for fattening sheep. Pigs should have warm food in severe weather. Those of large size should be marketed while the weather remains cold.

Hops should be ploughed or dug, or both. The old bines should be cut off and burnt up at once. No treading or poaching of the ground in wet weather should be allowed after digging. Finish getting on manure where needed; also poles.

Pastures may now be well dragged and rolled, and towards the end of the month artificial manures may be applied. Keep them clear of stock, especially where intended for mowing. Attend well to irrigated meadows, turning the waters on and off alternately.

Roads should receive attention, metal being put on, and the drainage and water-tables being well looked to. Cover the surface with finely-broken stone of the best quality, and exclude dirt and all soft material.

Poultry.—Well-fed and well-sheltered hens will now begin to lay. Keep the eggs in dry bran or sand. Turkeys will soon commence laying. Geese may be sat directly sufficient eggs can be obtained.

Dairy.—Keep down-calving cows well sheltered and liberally fed. Give carrots and even a few wurzel. Cows intended for the pail may have their calves removed at the end of a week from calving. Kind treatment of cattle is essential to success in dairy management.

Estate Work for the present month will consist in the clearance of underwood and timber falls, and getting in fuel for the house, and for lime or brick burning. Road and fencing materials may also require cartage.

A. J. B.

WOODWORKING MACHINERY FOR ESTATE PURPOSES.

WE have recently had our attention called to a machine especially adapted for estate work, which is now being introduced by Messrs. M. Powis Bale and Co., saw-mill engineers, 20, Budge Row, London, E.C. It is chiefly designed for slot mortising and boring rail posts, &c. for fencing and similar kind of work, but a circular saw and other appliances may be added. The *modus operandi* of the machine will be readily understood. The mortising is performed by a peculiar shaped revolving tool or bit, the wood to be operated on being cramped on to the table, which is arranged with lateral and transverse movements worked by the lever and hand wheels shown, the wood can thus be advanced to or retired from the mortising tool, as the depth of the mortice may require. This table can also be raised or lowered to suit varying thicknesses of wood. The holes or mortices can be cut at any desired distances apart, or any length by utilizing four adjustable stop brackets which are fitted to the table. The main frame of the machine is very strong, being cast in one piece, the mortising spindle is of steel running in extra long gun-metal bearings.

By the use of this machine, which has been made as simple as possible, a large amount of work may be turned out even with unskilled labour at a much less cost and of better quality than by hand.



ENGLAND.

PLANTING in the woodlands should now be completed, as there has been no hindrance from the weather during the whole winter. Early transplants of large size have been very much knocked about by the high winds; but in other respects the work of the autumn and early winter has been most successful. After the dry weather which we have had since the middle of January, even the wettest lands may be planted up; and with other work well advanced, nursery transplanting may now proceed.

In public nurseries overcrowding is too frequently practised, and hence the large quantities of ill-grown and weakly plants which are sent out. But robust plants can be obtained only by giving plenty of room. For the bulk of nursery produce two feet between the rows is by no means too much space. The silver and spruce firs and some others of slow growth may do with eighteen inches; but these should have at least five or six inches from plant to plant. The generality of hardwoods will do with about four inches. But the horse-chestnut requires six inches.

In nursery transplanting the roots should be well covered, but with not more than an inch of soil. Deep planting is injurious to trees of all sizes. The hardwoods intended to be set out in rows are generally commenced with as soon as November arrives. Pines and larch are best removed in spring; but no removals of any kind should take place in frosty weather, as the injury to the young fibres is certain to tell upon the aftergrowth of the trees. A good rule which has for a long time prevailed in some of our best nurseries in the North is to remove all large plants at the end of autumn and the beginning of winter; two years' seedlings between the middle of February and the beginning of March; one year's seedling larch during March, and other seedling pines in April.

Good progress should now be made with the falling of underwood, and as an early spring may reasonably be looked for, the produce should be cleared out as rapidly as possible.

Manures and composts have not to any great extent been carted upon the nursery-grounds, owing to the absence of frosts. But seed beds should now be prepared for elm, sycamore, maple, ash, and

beech. Acorns, walnuts, and chestnuts may still be sown or drilled in. Use freely both powdered charcoal and wood ashes.

New osier beds may be planted any time before the end of the month. Choose clean good land which may be either flooded or laid dry as required.

Plant up hawthorn hedges at once that they may become well established before spring. Upon poor land this seldom makes a strong fence alone; and on chalky soils a large admixture of beech may be found desirable. Land too wet for the above plants may be fenced with willow or alder; young plants or cuttings being placed upon raised banks or mounds.

Plantation and wood hedges should be plashed as soon as the produce is cut. The less dead wood is put into them the better. A live hedge thinly laid will soon thicken sufficiently. The live pleachers left in a hedge are too often smothered up with dead thorns. Fill up gaps with strong plants or layer carefully across them.

Order in nursery seedlings to fill up cleared spaces, and purchase seeds for the seed beds. Both require great care and judgment in the selection.

Attend well to clearance roads, laying on stone or brush where required, and filling up ruts, or rather preventing their formation.

Put into the nursery cuttings of elder taken from last year's shoots, with a pair of eyes above and another below ground. Select poplar cuttings from the thick end of the last year's shoots. Willow cuttings about 9 inches long may be left 2 inches above ground.

Piuckley, Kent.

A. J. BURROWS.

SCOTLAND.

THIS winter will not only be long remembered for the mildness of the weather, but equally, if not more so, for its numerous and severe gales, which have caused great destruction to plantations and other property. On the 6th of last month another severe gale passed over the greater part of Scotland, and, I believe, in various localities the force of it was more felt than that of any of the previous gales, and consequently the results have been somewhat more destructive. In this locality we have again escaped with comparatively little injury. Here and there a few blown and broken trees are to be met with. In the various districts which I have had occasion to visit, or pass through, since these gales occurred, I have observed that the blown trees are not generally the most exposed, but are chiefly

in damp or soft ground, or where from some other cause the roots are partially decayed or decaying; clearly showing the necessity of proper drainage, so as to assist in keeping the roots healthy and the ground firm. The drains should not only be frequently well cleaned out, but should be somewhat deepened as the roots descend. In my opinion the condition of the soil has more to do with the uprooting of many trees than the "nursery treatment" of the plants, about which some of your correspondents are debating.

Continue the thinning of plantations, the felling and cutting up of timber as before recommended. The cutting of all saleable timber unless what may be afterwards required for immediate use, should be completed this month.

The weather has been, and is still, extremely favourable for planting operations, which should now be pushed forward. Unless an unfavourable change in the weather takes place we will have an early spring, and it is important that there should now be no delay in planting, particularly early deciduous trees; evergreens can be planted later on. In this district, the earlier flowering plants, such as the common whin and others, are already in bloom.

Continue the trenching and draining of land, the formation of roads and other groundwork improvements; but complete as soon as possible all repairs in existing roads, walks, and drives.

In the nursery, top-dress and dig vacant ground. Remove from and transplant plants, cutting back or securing all competing shoots, and string side branches of hardwoods; and also all straggling root fibres. A fibrous growth will be encouraged by the cutting back of all base roots. Transplanting in the nursery should not take place when the ground is too full of moisture, particularly when inserting seedling plants.

Hoe and clean shrubberies; cut out dead wood, and prune and dress evergreens. Collect tree seeds.

Darnaway, N.B.

D. SCOTT.

IRELAND.

CONTINUE cutting heavy timber and thinning growing plantations. Finish all operations in game covert within the month. Additional coverts for game may still be formed by layering. Holly, laurel, &c., are easily converted into thick undergrowth.

The past season has been most propitious for planting, and most of

this work will now be approaching a close, so that much can be done in the way of filling-up the home nursery. Much of the future growth depends on early planting in the nursery, and when done in dry weather much time is saved both in the work of planting and summer weeding. Plant thorn hedges on prepared ground. When this has to be done on the top of ditches the earlier planted the better the success. Finish the trimming of all fences, and get all enclosures into a thorough state of repair.

If any pruning has to be done—and after the late gales there is likely to be some—it would be well to attend to it at once, as the sap will soon begin to flow. Indeed, sycamore and other trees which bleed freely in spring ought not to be touched after the first week or ten days of the month.

General planting should be pressed on unless already finished for the season.

Ballinacourte, Tipperary.

D. SYM SCOTT.

WALES.

WITH a continuance of open and mild weather, all planting operations should be well advanced. The work may, however, be continued during favourable weather. Where land is still undrained or in want of preparation by ploughing or trenching, planting may be advantageously left over till autumn, when the ground will be in good order to receive the young plants.

The cutting down of hedgerow trees, and the thinning of plantations of all sorts may be continued as last month. Hardwood and hedgerow trees should be finished falling as far as possible this month. Bind up faggots, cut and prepare firewood, and cart home and stack it where required for home consumption.

Plant young hedges in ground that has been well prepared by trenching, and in good condition to receive the young plants.

As planting is drawn to a close and the nursery ground becomes vacant, it should be well trenched and turned up; vacant ground, which has been well manured and a green crop taken therefrom, should be filled up with young plants, preparatory for another year. Put gravel on carriage drives and walks, and give continuous rollings with a heavy roller.

Kimmel Park.

LEWIS BAYNE.



Of all the various branches of natural science of which an intelligent forester must acquire some practical knowledge, there is, perhaps, none to which so few direct their thoughts as to the study of entomology. It is not so attractive a study as botany, geology, zoology, and the like; but it is quite as important as any of them in regard to the practical use to which a knowledge of the nature and habits of injurious insects can be put by an observant and careful forester. The difficulty of the subject, and what the vulgar call the "break-jaw" nomenclature, are usually put forward as an excuse by those who have not taken the trouble to acquire even a rudimentary knowledge of insect life; but neither of these presents any serious obstacle to those who are anxious to learn. All that it is really useful to the forester or farmer to know about the life history and habits of insects, can be learned in a few hours' study of such an easily understood and simple pamphlet as that which has just appeared from the pen of our talented contributor Miss E. A. Ormerod. The objects of the pamphlet formed the subject of a "Lecture on Injurious Insects," delivered by Miss Ormerod at the Royal Agricultural College, at Cirencester, to the students and others on the 20th of last October. Every forester and farmer in the country should obtain a copy of this valuable introduction to a useful knowledge of entomology, which is plainly written and neatly illustrated, and forms an

excellent preliminary study to Miss Ormerod's larger "Manual of Injurious Insects." It is published by Messrs. Sonnenschein and Co., Paternoster-row, London, at the small cost of sixpence, and may be had through any bookseller.

* *

At the mature age of sixty-eight, the Right Hon. James Kenneth Howard died at his country residence, Hazelburg House, near Newbury, Hants, on the 7th of January. As one of Her Majesty's Commissioners of Woods and Forests since 1855, Mr. Howard may be said to have been at the head of the profession of forestry in England for more than a quarter of a century. The major portion of the Crown forests and plantations were under his management, and he took an active part in everything that conducted to their improvement or added to their value as national property. Had his sound advice been followed by the Government in regard to the New Forest, it would not now be the worthless property it is to the State, nor the discreditable example of profitless forestry which it exhibits to mankind at large. In Mr. Howard the country has lost a far-seeing and faithful servant, and forestry one of its most intelligent and enthusiastic votaries.

* *

Whoever the Government may appoint to the vacant office of Commissioner of Woods and Forests, he at least should be a man of large experience in the management of

landed property, and specially qualified by natural taste or practical experience in the science of forestry. Without these qualifications the ablest clerical administration will be but the square peg in the round hole. There are plenty of able and duly qualified men to choose from, and the Government should take every precaution to select the very best man that can be got for such an important post.

* *

The habit of making a fair estimate of the cubic contents of a growing tree by the eye alone, without the aid of any measuring tape or instrument, is often acquired with wonderful accuracy by foresters and timber merchants through careful study or long practice. Few of them, however, can judge the total height of a tree, with anything like the same exactitude. Whenever their eye has to ascend above the height of measurable timber it fails to grasp the more irregular outline of the umbrageous head and to compute its height with any greater facility than that of any other person. This is easily accounted for by the fact that they never give a thought to the total height of a tree, and when the stem tapers below timber size, they pass it over as of no account. Still, by a very little practice, any man with a good eye for estimating heights or distances, can readily acquire great accuracy in calculating the height of a tree by a glance of the eye. Every forester should practice this art, so as to be able to tell within less than a yard the height of any tree. We have met with men who by careful practice could invariably give the height of a tree within a foot or less of its actual measurement. By diligent study and practice, a similar exactness can be acquired by most men.

* *

The review of the Forest Administration in India for the year 1879-80,

by Dr. Brandis, has recently reached us, and gives an interesting account of the progress made during the year by the Indian Forest Department, with many suggestions for its future improvement. A considerable advance has been made in the surplus revenue derived from the forests, compared with the preceding year, the surplus having risen from about fourteen and a quarter lac of rupees to about twenty and a half lac—but still it is about seven lac under the surplus realized in 1875-6. The total area of the reserved forests in India, on the 31st of March, 1880, amounted to 15,344 square miles. The rights and customs of the natives interfere greatly with the extension of the reserves, but as arrangements can be made, the area is being gradually extended. The use of pine and other soft woods, impregnated with creosote or some other preservative, is recommended for railway sleepers and similar purposes; but owing to the cheap rate at which European creosoted pine can be imported, creosoting of soft timber is found to be unprofitable at the present time. Hopes are, however, entertained that as prices of imported timber rise, the process may be successfully carried on in India, so as to supply all the lines of railway with cheap and durable sleepers. On the whole, we may draw from the present report a conclusion favourable to the future prospects of forestry in India.

* *

In the matter of forest conservancy the Colony of South Australia displays the most systematic and rapid progress of any portion of Her Majesty's dominions. The Forest Board appears to be composed of gentlemen who take an intelligent interest in the important work committed to their charge, and which is carried out by their officers with great skill and indefatigable energy. The report of the Board for the year 1880-81 is now before us, in which

we observe that much progress has been made within the past year in the demarcation of forest reserves, and the planting of large areas with trees of a suitable nature. Among the most successful of exotic trees, the pines, ash, and catalpa are specially noted. It is also stated that the farmers and landowners in the Colony are giving much attention to the subject; and, fostered and encouraged by the excellent example of the Government, they will find it a profitable and attractive mode of investment. Many interesting details of the work in progress, and excellent suggestions regarding the future management of the forest, are given in the report by the Conservator of Forests, J. E. Brown, F.L.S. The report is illustrated, as usual, by several well-executed plans of portions of the forests where special operations have been conducted. It is evident that South Australia means to lead the van in Colonial forest conservancy.

* *

It is now twenty years since the cultivation of cinchona was first commenced in Southern India, and from the Government Report lately issued we are glad to learn that the experiment has been wonderfully successful. The number of trees now planted out is more than $4\frac{1}{2}$ millions. At present the greater part of the bark produced appears to be consumed in supplying the medical depôts at Calcutta, Bombay, and Madras; but upwards of 3,000 lb. was last year sold to the public, and the annual yield is rapidly increasing with the growth of the trees. The actual profit last year on the capital of the plantation is stated to have been 8 per cent.

* *

A discussion has lately been going on in the *Times* on tree planting in Ireland, and the benefits that would arise from the extensive planting of the bogs and waste lands of that country. In a long

letter by Mr. W. H. Ablett, an interesting sketch is given of the well-known examples of successful planting of waste and barren tracts in Scotland and France, and many excellent suggestions have been made as to the best method of going about the work of clothing Ireland with a green mantle of trees. The wretchedly bleak and treeless aspect of many parts of Ireland, forcibly strikes travellers from Great Britain and makes them wonder at times if they are really in a civilized land, or have fallen upon a portion of the world new to science and the arts of civilisation. How this cheerless scene is to be improved, and rendered healthy and habitable for man and beast, is one of the most pressing questions of the day. A fraction of the vast sum now being spent in preserving a State law and order in that unhappy country, would go a long way in paying the cost of planting many of the bleakest spots, and would do more towards the improvement of the country and increasing the comforts of the population, than any proposal which has yet been suggested for remedying the evils from which landowners and land occupiers are suffering.

* *

We hear that a scheme has been submitted to the Government for the creation of a Forest School for England in the neighbourhood of London, and another for Scotland, in Edinburgh. It is of great importance to the country that a Forest School should be established with the least delay possible, but the exact locality of its head-quarters is a matter of less consequence where the conveniences for travelling are so ample. To some London has many attractions, as being the great centre of the empire; but for educational facilities and easy access to the best examples of forest management in Great Britain, Edinburgh has undoubtedly greatly superior

claims. From our own experience, we know that forestry and forests management receive more than double the attention of those interested—landowners and foresters—in Scotland than it does in the whole of England. As a rule, woods on most estates in England are looked upon as of secondary importance in the annual return received from the land, while in Scotland the returns from woodlands are held to be of primary importance, and most come in as regularly as the rent from arable land. Exceptions are easily enough found, but at the present time the difference between the systems generally followed in each country is as we have stated, and there can be but one opinion about which is the best system in which to train young foresters.

* *

Considering the nature of the climate and the prevailing scarcity of timber trees in a large portion of our South African possessions, it is surprising that the Cape authorities are so careless about the promotion of a complete system of forest conservancy throughout the Colony. Several attempts have been made to rouse public attention to the disastrous results which are certain to follow the neglect of the question for even a very limited period, but still the authorities at the Cape are unable to make up their minds as to the pressing necessity for the establishment of a Forest Board, fully equipped in every branch to undertake the conservancy of existing forests, and the construction of new ones on a scale of sufficient magnitude to meet the requirements of the country. It is true, that a Forest Conservator has been employed by the Colony, but his report for the past year appears to be a mere record of crippled means and suggestions rendered impotent by the obtuse niggardliness of the Cape Parliament. For the credit of the colonists and the welfare of the

country, this most unsatisfactory state of matters ought to be speedily put an end to, by insisting that those in charge of Colonial affairs shall treat the subject in the comprehensive and liberal spirit which its vital importance demands.

* *

The Indian Cedar, or Deodar, furnishes to Northern India a large proportion of the most useful as well as durable timber employed in the country, and the conservation of the Deodar forests has formed a subject of much solicitude to the Indian Government for many years. Several reports have, from time to time, been made on their extent and condition, and the best methods of working them. One of these has lately reached us, on the forests of Busáhir in the Sutley Valley of the Punjab. It is drawn up by Dr. Brandis, the Inspector-General of Indian Forests, and is the result of an inspection made by him in May and June of the past year. It will be read with great interest by every one concerned in the prosperity of these forests, and the permanent supply of one of the best kinds of timber produced in India. From Dr. Brandis' statement the forests, under proper management, are capable of giving a largely increased supply of timber; and he gives many excellent suggestions and details by which this desirable result may be obtained. As a whole the report is one of the most interesting and valuable which has been issued on any portion of the forests of India, and merits the fullest consideration being given to it by the Government, so that Dr. Brandis' able suggestions for the management of these valuable forests may be carried out with the best results.

* *

A case of considerable interest to planters was tried in October last in the Surrey County Court, held at Guildford. A nurseryman brought an action against a gentleman for

the balance of an account for altering and laying out pleasure grounds, and for planting them with trees and shrubs. The planting was done in 1879, but a large portion of the trees, and some shrubs, had died out, and for which the defendant declined to pay, as the plaintiff refused to replace them. The judge held that the dead trees and shrubs ought to have been replaced by the plaintiff, and gave judgment for the defendant, with costs, and an application by the plaintiff, for a new trial was refused.

* *

In the whole extent of Ireland, there is no district, however bleak, boggy, or rocky, in which trees will not grow and thrive. The barest and rockiest parts of Connemara or Donegal may soon be covered with thriving woods, if experienced men are appointed to carry out their formation, and the after management of the woods entrusted to trained foresters. The labour required in making the plantations would prove highly beneficial to the now half-idle inhabitants, a large number of whom would secure permanent employment on the forester's working staff; while the shelter afforded to the crops and cattle on the better parts of the land would soon double the produce, and prove an inestimable boon to the country.

* *

Mr. James Kay the able and intelligent forester to the Marquis of Bute at Rothesay, was on Friday, the 20th ult., the recipient of a very pleasing testimonial. It appears that Mr.

Kay has for some years been acting as meteorologist to the Archæological and Physical Society of Bute, and his annual reports, from their wonderful completeness and accuracy, have attracted attention far beyond the beautiful island whose genial climate they so faithfully recorded. The presentation took the form of a barometer and a purse containing twenty guineas, with some handsomely bound volumes for Mrs. Kay, who has greatly interested herself in meteorology, and has rendered much assistance to Mr. Kay in his observations.

* *

It is with a sincere regret, which will, we know, be shared by all readers of this *Journal*, that we have to record the death of Sir Robert Christison, which took place at his residence, in Maray Place, Edinburgh, on January 27th, at the age of 85. The story of his long and successful career as a man of science and one of the most eminent physicians of his day, is well and fully told elsewhere; but it is as a lover of trees, and a loyal and earnest worker in the field of arboriculture that we mourn his loss. At the meetings of the Arboricultural Society in Edinburgh, Sir Robert Christison was a frequent and welcome visitor, and his lucid and masterly addresses were always listened to with the deepest attention and appreciation; his observations on the growth of trees have been most exact and of the greatest value, and they were, we understand, being diligently proceeded with up to the time of his last illness.





NURSERY TREATMENT OF PLANTS.

SIR,—With much interest I read the letters from Messrs. Mackenzie and Scott, in your last three issues.

Mr. Mackenzie, p. 527, says, "The system of elaborate nursery treatment is fast growing to be pernicious to the ultimate well-doing of the trees." Will he be so kind as to explain what he calls "elaborate nursery treatment," and give the facts on which he founds the assertion, that such treatment is growing to be "pernicious to the ultimate well-doing of the trees"?

At p. 676, Mr. Mackenzie is quite correct in saying, that the very large extent of *natural* woods in the United Kingdom are grown from self-sown seeds; nor need anyone try to deny the excellency of the timber of those woods, especially that of fir and oak; and when such natural growths become universal all over the country, there will then be (and I venture to affirm not until then) a "sufficient proof that nursery treatment can be almost, if not entirely dispensed with, so far as the rapid and valuable production of timber is concerned;" but then, the universal growth of trees from self-sown seed does not exist, and therefore the nursery treatment of plants becomes in the estimation of the most of practical men, to be an absolute necessity, in order to prepare young trees to be planted where Nature has not sown them.

If I understand Mr. Mackenzie aright, p. 527, he gives us to understand that he finds seed do better in very exposed situations than trans-

planted plants. Let us suppose he means Scotch fir seeds and plants. Perhaps he will be good enough to tell us something more about this. Will Mr. Mackenzie kindly state if I am correct in supposing, that he means to say (page 677) in effect, that if a piece of rough hill ground with a covering of from four to six inches of rough heather, and very foggy, and this spot divided into a hundred plots of, say, ten yards square each, and that half-a-pound of seed (Scotch fir let us suppose) was sown as equal as possible over fifty alternate plots of these; that at the same time he took another half pound of seed from the same bag, and sowed it in a seed bed in the usual manner in the nursery, and at the same time; that two years after this, he thinned out the best of these plants, amounting to a third of all in the bed, planted them in the usual manner in seventeen of the remaining fifty plots, and next year took the remaining two-thirds of the plants which grew from this half-pound of seed, and planted these again in the thirty-three remaining plots; that in fifteen years after this, he found the plants more numerous from seed sown on the spot, than from the same quantity of seed first sown in the nursery, then planted into the alternate plots as described; that the plants from the one were taller, stouter, better-rooted, and composed of a better quality of timber than the other, or those planted out from the nursery?

I quite agree with Mr. Mackenzie in thinking that "the nearer we come to Nature's laws the greater will be our success in planting," and I have no doubt but he will agree with me in thinking that the closer we study

these laws, the better we are able to judge, and direct Nature's forces for man's good.

D. McCORQUODALE.

Dunrobin, Golspie, N.B.

PLANTING UNPROFITABLE LAND.

SIR,—Attention having again been drawn to the "planting of unprofitable land" in these pages, I may perhaps be allowed to offer a few remarks thereon for the consideration of those who may come to see the advantage to be gained by planting what may be taken as unprofitable for either tillage or pasture. The extent of such land throughout the country is considerable, and it is surprising that up to the present time, so little has been done in the way of lessening that area by planting either for the most desirable purpose of shelter to the adjoining land, or with the view to a profitable return. One deterrent cause, and one that is occasionally pointed out, is the attempts, generally on a small scale, that have previously been made to form plantations, but which have failed, thereby engendering the idea that the soil was not adapted for the growth of trees, and that further efforts in the same direction would end in a like manner. The saddle in these cases was, however, generally put on the wrong horse, as the correct cause of the failures could be traced to either the non-adaptation of the plants to the soil, or inefficient supervision, resulting in the plants being damaged by frosts or drought before being planted; also in improper planting, and in the want of attention to the plants for the first few years after the formation of the plantation. When such work is carried out under experienced supervision, no matter on what variety of soil, if the plants are suitable the operation should be attended with success.

Apart from the value of plantations as an investment, and the beneficial influence they exert, when judiciously distributed, upon the adjoining land, the soil under a crop of trees is improved, owing, in a great measure, to the accumulation of vegetable matter on the surface, in the shape of decayed leaves, branches, and undergrowth, and to the opening up of the subsoil (by the action of the roots) which receives the benefit of the infregients carried down with the water that now sinks with greater facility. There is little doubt but that the value of home-grown timber will increase as the area of the foreign reserves diminishes, and if a profitable outlet could be obtained for what may be termed the refuse of plantations, such as rough, unsaleable timber, branches, and chips, the present value of woodlands would be enhanced, as there are, I may safely say, some thousands of tons of such material throughout the country that do not yield any return whatever; and this is often augmented in some out-of-the-way districts by varieties having been planted which are now unsaleable, owing to their distance from a profitable market.

The erection of machinery, by public or private enterprise, on extensively wooded estates or in the centre of well-wooded districts, for converting the waste products of the plantations into pulp for the manufacture of cardboard or paper, is a matter well worthy of serious consideration. In Canada, there is, I believe, a considerable and profitable business of that description carried on, and I have seen it stated that the branches, &c., can be ground there into pulp and delivered in England at a cost of two pounds per ton, while the average price of that article in the London market is ten pounds per ton. One is apt here to speculate on the quantity of raw material that it would take to produce one ton of pulp, and the

outlay required for the erection of machinery to turn out a certain quantity, but I will refrain from doing so, and leave it to some one better acquainted with the subject to supply the necessary statistics.

Having ventured to say this much, I will close with the remark that when forming plantations for the purpose of profit, plants should not only be selected to suit the soil and position into which they are to be placed, but those only ought to be planted that, under the circumstances, would ultimately reach the greatest value.

A. SLATER, JUN.

*Wyreside Cottage, Lancaster,
January 16th, 1882.*

BLOWN DOWN TIMBER.

SIR,—In your Editorial Notes, p. 685, you refer to the great destruction caused to plantations in many parts of the country by the severe gales of October and November last, and offer the sufferers the very sound advice, of not forcing their “timber into the market while quotations are so low,” and to wait rather until the present glut is exhausted. This naturally suggests the question to each sufferer:—“If I am to wait, what is the cheapest and best way of preserving my timber for a time?”

Fortunately for us the severe gales to which you refer must have exhausted themselves before they got our length, because we only lost a few in some parts of the plantations. But we have not always been so fortunate. Some years ago a gale gave us a glut, and we, as much as possible, left the whole trees attached to their roots, to lie as they fell, until we got them sold; and some Scotch fir and hardwood lay in this state for three years without being in the least the worse. What saved them was, that their branches not only kept their trunks up off the ground, thereby

permitting a current of air to pass round them, but from the one-half of the roots still holding by the soil, a current of sap flowed through them, especially during the growing season, causing a continuous though sluggish growth.

D. M'CORQUODALE.

Dunrobin, Golspie, N.B.

TREE RAISING.

SIR,—Upwards of 60 trees of large dimensions have now been raised here; and although we have had some very severe gales in this district since the work was completed, not one of them has been shaken or damaged.

The largest tree raised is 12 ft. 6 in. in circumference at six feet from the ground, and contains about 300 cubic ft. of timber; and there are at least 12 others of scarcely inferior dimensions.

R. R. BUCHANAN,
Forester.

*Dunse Castle,
January 18th, 1882.*

POLLARDING SCOTCH FIR.

SIR,—It may interest your correspondent who wrote you about this in your last issue to know that a hill stands near the centre of a somewhat large plantation here, composed of some hardwood and spruce, but chiefly of Scotch fir, all healthy though growing slowly, on thin, poor soil. Towards the top of this hill the ground rises somewhat abruptly, and terminates in a roundish table. From this a magnificent view can be got of miles of sea, and of an ever-varying sea-board, and of hills and dales.

These trees, ten years ago, were from 15 to 20 ft. high, clad with green foliage down to within about 4 ft. of the ground, and so completely shut up was this hill-top, that very little could be seen from it. To remedy this evil, we pollarded from 3 to 8 ft. of the top

of each tree that stood in the way, with the exception of a few left to cut up too large a view into more varied and pleasing sections.

This work we did in winter, when the sap was least active. The hardwood we cut close down to strong, live branches, but the Scotch fir and spruce we only cut close underneath whorles of branches, thus leaving stumps about 1 ft. long on each tree, with a view to discourage the upward flow of sap beyond the live branches, and thereby as much as possible to discourage "bleeding." These stumps, as may well be supposed, looked very ugly, although at the time useful. When the season's growth was over, and about the middle of August, we cut off all those stumps close down to the living whorles of branches, and coal-tarred the wounds thus made. A few "bled" a little, but it did not appear to have affected their growth in the least. Since then we had to pollard some of the branches of those we pollarded at first, with the same good results.

No doubt to have pinched out the top buds might have had the same effect, and would look much neater if done in time, that is to say, when one could reach these tops without the aid of ladders; but where they have to be used, disbudding would become more tedious, and very expensive.

D. M'CORQUODALE.

Dunrobin, Golspie, N.B.

PROTECTING TREES FROM RABBITS.

SIR,—In referring to what Mr. Henderson says about this in your last issue, it is very interesting to know that larch bark lasts so long as a guard to young trees.

No doubt the bark of any tree will answer as a guard to a smaller tree, and might be used to advantage if taken off one tree and placed round another, not far from the one off

which it was taken; but the question before us is, Which is the cheapest and best rabbit tree-guard for general use, where economy counts for everything, and appearance, whether black or white, for very little? and also, Which is the most suitable near mansion-houses, where appearance is everything, and economy a very important consideration? Let us now further see what Mr. Henderson says in favour of his bark guards, which may be put thus:—

1st. To bark and dry these guards.

2nd. To cart them, say three miles, to be stored "in an airy loft," until he finds time for using them.

3rd. If he cannot hire a loft he must erect one near where a boiler or stable dung is.

4th. In store it becomes hard, and must be made soft by being steamed "over a boiler," or by laying it "for a day or two in hot stable dung" before being used.

5th. After this it may have to be carted another three miles to where the trees requiring protection are.

6th. Archangel tar has to be bought, and taken to the place where these guards are to be used, so as to have them dipped in it before being used, to make them more durable.

7th. In placing these round the trees they should be "sunk into the ground for a few inches," then to be tied round with wire.

Assuming that an ordinary good workman gets 2s. 6d. per day, and a carter 6s. per day, it will be interesting to know what Mr. Henderson will undertake to guard each tree at. I submit that anyone of experience and taste will say that wire netting guards, painted grass colour or green, or any other colour the owner pleases, as I suggested at p. 267 of your August issue, is by far the neatest and cheapest, and altogether the best.

D. M'CORQUODALE.

Dunrobin, Golspie, N.B.

SIR,—If your correspondents will use coal-tar *water*, thick or thin, according to the age of the plants, they will find it better than plain coal tar. I have used it for ten years, applied with a brush and switched over the plant.

ARGYLLSHIRE.

SIR,—I am obliged to Mr. McCorquodale for the information given at page 678 of your last number about thin coal-tar. Up to this time we have used the same material with which we tar fences, and which is got from the ironmongers. I also gather from his letter that he has in actual fact employed his men to rub the tar on trees with a rag in their "bare hand." This is surely a most objectionable way of handling tar. It is a very serious matter to clean one's hands at night after a day's tarring, although protected by a brush. What it must be after the rag process we can only be left to imagine. I may add that such a plan is quite unsuitable here, as we have to use a long-handled brush to reach the stems of our holly hedge, which in some places is six feet thick. This also applies to many of the other hollies on the estate, where the branches are so low and thick that it would be very awkward for a man to crawl in with a tarry cloth in his hand.

Then as regards young trees being injured by brushwood being tied round their stems. We have it conclusively stated by a certain gentleman, that he has seen young trees so treated becoming shambling and unhealthy.

Mr. McCorquodale, however, disputes that, and gives a reason for so doing. His theory, stripped of all ambiguity, is to the effect that, if people wear clothes to promote their health, so the health of young trees will be improved by clothing them too. I hold that these things are so utterly dissimilar, that we have

no warrant to make any such comparisons. Moreover, there are millions of people in the world who do not wear clothes, or only the merest scraps of clothing, and yet they are as healthy as those who are heavily clad. We might as reasonably say that because a man's health is sometimes improved by his taking quinine, so in like manner a sickly tree will be invigorated by a dose of the same medicine. I trust Mr. M. was not in earnest when he wrote that my men must have killed the young hollies, by scalding them with boiling tar.

Along with many other foresters, I feel much indebted to Messrs. Webster and Henderson for the valuable hints they give at page 679, as to the preparing and fixing of the bark tree guards. It appears Mr. Henderson has been in the field long before me with them, and I hope he will not complain when I say he would have done us all good service if he had given us the information in "Our Journal" a good deal sooner.

Dalkeith.

ROBERT BAXTER.

TIMBER CULTURE IN THE UNITED STATES.

SIR,—It may interest some of your readers to know that under the Timber Culture Act an applicant is entitled to 160 acres on any section naturally devoid of timber; the whole section must be devoid of timber. On each section only one timber claim can be taken. It requires eight years to acquire a title. Actual residence is not required. The first year five acres must be broken. Second year he must cultivate this five and break five more. Third year he must plant the first five acres in trees and cultivate the second five acres. Fourth year he plants the second five acres in trees, which make the ten acres. On the day of final proof 6,750 trees must be living. The total cost of this 160 acres of land is fourteen dollars.

The applicant must be the head of a family (or over twenty-one years of age), who is a citizen or has given notice of his intention to become such. Many have gone into Western Nebraska and taken by pre-emption, for which actual settlement and improvement is required, 160 acres, costing for Land Office fees 18 dollars, and at the same time taken another 160 acres under the Timber Act, thus acquiring 320 acres of land at a cost of 32 dollars. The late amendments to the law provide that in case of destruction of young trees by grasshoppers or unusual drought, the time shall be extended. Our Government are and can well afford to be liberal with the public domain, so much of which offers great inducements for forest planting, and that, too, by skilled men, for we need them here. I take great pleasure in reading the *Journal* as to the careful and systematic management of forests in Great Britain. This country is using the timber of our forests at a rate really alarming. The walnut in the past five years has increased in price 500 per cent. This has been due to the export trade. The pine forest east of this point will not last another eight years. We now have in the United States but one great tract, and that is on the Pacific coast. Three railroads will penetrate it this year, and then the slaughter will commence. A great part of this is called "yellow fir," but is better known as the Douglas spruce *Abies Douglasii*. A large amount of shipbuilding may be expected to be carried on at Puget Sound when railroads reach it.

J. T. ALLAN.

Omaha, Nebraska, U.S.

SELLING TIMBER IN IRELAND.

SIR,—Having a quantity of blown down timber to dispose of in one of the northern counties of Ireland, near good railway and water carriage, can some of your Irish

readers give me information on the following points? viz.: price of Larch and Scotch fir pit wood, price of Ash suitable for handle wood; of Ash, larger size; also of Wych Elm and Oak, same sizes as the Ash. Is there a demand about Londonderry or any of the towns in the north-west? or would I make a better price by shipping it to Glasgow or some other Scotch port? If the latter is recommended, can they give me the names of any likely purchaser? or can some of your Scotch readers inform me on this point? and oblige

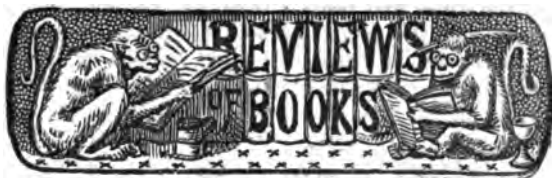
ERIN.

THE AUTUMN GALES AT GLENMORISTON.

SIR,—A strong gale blowing from south-west swept over this district on the 20th and 22nd November, doing great damage to house property, trees, &c. In two small clumps of wood, near the Mansion-house, there are 36 spruce trees from 40 to 50 years of age blown down, 4 Scotch firs, 1 Cembra pine, and 4 larches, the latter about 60 years of age. These have been all uprooted, besides a number of old oak trees, which have lost their leaders and a few of their branches. One old ash tree in the garden has been blown over, and damaged the garden wall to some extent. About 8 miles further up the Glen, in one small plantation of about 4 acres of Scotch firs, 46 years of age, 120 trees have been torn up by the roots, and lie broken and strewed about in every direction. Several firs and birches are blown down in other parts of the estate, but we have not been able to count them yet. Young plantations have suffered more or less, but not to any great extent. Wire and stone fences have also been damaged by the falling trees.

C. STUART, Forester..

[This letter was accidentally omitted from a previous number.—ED.]



THE November issue of *The Florist and Pomologist* contains two plates, well coloured: *Aruncus Astilboides*, a native hardy herbaceous plant of Japan, found in high mountains; and samples of choice *Gloxinias*. The latter plate, from the nature of the flowers, presents a beautiful illustration. The article on "Vines and Vine Culture" is continued, and the following among others help to form an interesting number:—"The Herefordshire Pomona," "Mushrooms," "A Heteromorphous Apple" (illustrated), "Archdeacon Lea's Fruit Trees," "Peaches and Apricots on Walls," "In Memoriam," &c.

Where to Find Ferns. By FRANCIS GEORGE HEATH. London: Sampson Low, Marston, Searle, & Rivington, 1881.

This is another charming little book from Mr. Heath's fertile pen, which equals in interest any of the previous productions of the same writer. On taking up the volume we are at once struck with the brevity and conciseness of its chapters and the comprehensiveness of their contents. A long study of the fern world and an intimate knowledge of the habitats of the fern tribes have enabled the author to produce a work which will become the pocket companion of the fern-hunter throughout the land. Not the least interesting portion of the book is the opening part which treats of ferns and fern habitats, and a close perusal of which will enable the merest tyro to give an intelligent description of whatever ferns he may alight upon in his travels. In the introductory chapter Mr. Heath

says:—"Fern-hunting, to lovers of ferns, is one of the most delightful of pastimes. It gives zest to any country walk, because it adds the attraction of a hobby to the pleasure of being out of doors. Life, in the present age, is far too sedentary, and there exists a too great tendency to sit in rooms with closed doors and windows. Some people seem almost to dread air in motion, and they become, in time, so little used to it that at length the body itself is brought into a morbid state, currents of air become 'draughts,' and cold and illness are the result. The air is the best friend we have, and in seeking outdoor pastimes in the country we obtain it in its best and purest form. The seeker after ferns must ride his hobby into the wildest and most out-of-the-way districts, and into the most delicious nooks of greenery, must climb hills, wind through valleys, plunge into woods, follow the course of streams, search rocks, hedge-banks and forest clumps, examine old walls and tree forks, and look everywhere, in short, where green life has a chance of existence."

As an example of the author's succinctness of description, we quote the following chapter on

"THE LITTLE ADDER'S TONGUE (*Ophioglossum lusitanicum*).

"LENGTH OF FROND, two to four inches.

"GENERAL DESCRIPTION.—Roots few in number, fleshy, brittle; root-stalk small, upright in growth, fleshy, tuberous, elongated; fronds of two parts, barren and fruitful, consisting upon a common stipes of a single narrow, entire, somewhat grass-like barren pinna, and of a

taller branch forming a stem in continuation of the stipes, and bearing at the upper end the fruitful spike. There is a single barren frond (though sometimes there may be two barren fronds on the same plant) and a single fruitful branch, as in the case of *Ophioglossum vulgatum*, to which fern the present species bears a general though diminutive resemblance. *Fructification*.—The fruitful spike, pointed at the end, consists of two rows, one on each side of the rachis, of rounded spore cases, each row consisting, usually, of about five or six of these cases. *Habitats*.—Damp positions on heaths and on open pastures, amongst grass roots. *Where found*.—The only locality generally known is the island of Guernsey, where, in 1854, it was first discovered in the neighbourhood of Petit Bot Bay. It is said to have been found in Cornwall, and it is quite possible that, owing to its inconspicuousness, it may abound in many parts of the British islands without having been discovered."

Autumnal Leaves. By FRANCIS GEORGE HEATH. London: Sampson Low and Co.

Under the above appropriate title Mr. Heath has presented us with another of his welcome books on trees—a subject which he has almost exclusively appropriated, and as long as the monopoly is employed as it is at present, in supplying the public with a tolerably constant succession of pleasant and instructive reading, no one has a right to rumble. In the present volume the aspect of trees in the autumn is considered, when the fierce rays of the summer sun have done their work, and before the arrival of the early frosts, produce those lovely tints which make autumn glorious, and when the leafy lanes of some of our beautiful southern counties present masses of brilliant colouring almost artificial in their effect. In

this book Mr. Heath has very successfully carried out the happy notion, which he conceived in an earlier volume, of giving coloured plates representing the various kinds of leaves in their natural tints; the effect in this book is very natural, indeed we cannot speak too highly of the manner in which the drawing and colour printing of the plates (of which there are twelve) are executed. The further illustrating of the work—always a strong point in Mr. Heath's books—is accomplished by four excellent page engravings of views in the New Forest, and some vignettes of less merit, on the same subject; there are also some very pretty initial letters drawn by the author.

The book is divided into two parts, the first, entitled *Autumn Rambles*, being devoted to a very nicely written description of an autumn tour through the New Forest made by the author, and the second containing the coloured plates to which we have already alluded, with appropriate and accurate descriptions of the various leaves illustrated. The route followed by Mr. Heath was as follows; rail from London to Brockenhurst and walk thence to Boldre, then back to Brockenhurst, and after an exploration of the lovely lanes with which that district abounds, a circuit of the beautiful woodlands by way of Burley, Ringwood, Fordingbridge, Bramshaw, Stonycross and Lyndhurst, returning to Brockenhurst by the opposite direction from which the start was made. The New Forest is not now by any means the *terra incognita* which it was a quarter of a century ago, and it now forms the pleasant *locale* of a summer or autumn ramble to many a worker in our great towns, so that Mr. Heath here is writing of comparatively well-known ground. However, some of his word-pictures are very pretty, and what he has to say, if not always new, is always well told.

The following engravings, which are good specimens of the vignettes which form the initial letters of each chapter of the first part of the book, represent respectively two sentinel

Fig. 1



POND AT BRAMSHAW.

trees in Marsh Ash, and a pond in the village of Bramshaw, a most secluded, lovely spot of which even Mr. Heath can find nothing more to say than that it is "pretty, quiet, and rural."

Fig. 2.



TWO SENTINEL TREES IN MARK ASH.

We can well believe Mr. Heath when he tells us that some of the most glorious scenery was beheld in the walk from Fordlingbridge to Bramshaw. He says :

"As we turn into the descending road towards Bramshaw it seems as if all the colouring spread upon the wide-extending, open and heathery moorlands, through which we have been wandering, were compressed into a small space, for the enjoyment here is pre-eminently for the eye alone. It is veritable fairyland. The purple of the bordering heather; the gold of the dwarf furze; the feathery grace of the bracken, dyed in green and red and amber and orange; the glint of the holly, the deep glossy green of which sets off with singular beauty the bright red berries; the gold and green and bronze of the autumnal oak leaves, and the fiery glow of the fading beech—all unite to make a picture of surpassing loveliness which yet, in spite of its wealth of colour, does not dazzle but charms the eye."

It would be unfair to the author and inconsistent with the limited space at our disposal to make further quotations, which, however, there is a strong temptation to do; but the short extract we have made will convey a good idea of the pleasant style of reading which the book furnishes. To all lovers of the beauties of nature the splendidly coloured plates will heartily commend themselves, and to all such we cordially recommend "*Autumnal Leaves*."

The *Agricultural Gazette Almanack* for the year 1882 contains several articles of an interesting character, many being good reprints. The pages are full of portraits of celebrated agriculturists, cattle, horses, and sheep. A calendar for farming operations throughout the year, lists of societies, farmers' clubs, and principal fairs, help to make up some eighty pages of general and useful information.

Journal of the Royal Agricultural Society of England. Second series. Vol. XVII., Part 2. London: John Murray.

The valuable account of the amount and composition of the rain and drain-

age water collected at Rothamsted is continued in this number, and will well repay perusal by all who take an interest in scientific farming. Mr. James Macdonald, editor of the *Irish Farmer's Gazette*, next gives one of his careful and interesting papers on agricultural topics, the subject here treated upon being the famous race of "Polled Aberdeen and Angus Cattle." To every one who admires that hardy and profitable breed we would recommend a perusal of this interesting and well-got-up paper. "Secondary or Narrow Gauge Railways for Agricultural Purposes" are strongly commended in an excellent paper by W. H. Delano, A.I.C.E. A useful paper, on the culture and preparation of flax in Ireland and on the Continent, is contributed by Michael Andrews, secretary to the Flax Culture and Supply Association in Ireland. The editor of the *Journal* and secretary of the Society, H. M. Jenkins, F.G.S., supplies three very interesting papers to this number, treating upon various branches of agricultural industry in the Netherlands. The first is a short account of "Flax Farming in the Netherlands," and the third on the "Reclamation of Peat Land in the Netherlands," both containing much valuable information on these subjects. However, the second article is the one which will be read with the greatest interest by the general public, giving as it does a full exposition of "The Manufacture of Artificial Butter in the Netherlands," which is now carried on with great energy by several extensive firms, and forms one of the principal industries in North Brabant and contiguous districts. As described by Mr. Jenkins, the manufacture appears to be carried on in a perfectly legitimate manner, and the process seems both cheap and cleanly, so that no objection can be urged against the article as to its wholesomeness or nutritive qualities, but it is too often sold in

the market as genuine butter, from which it is not easily distinguished, and such a reprehensible practice should be met by severe punishment.

An exhaustive report is given by the judges on the Derby Prize Farm, Competition, 1881. The special feature in the farming of the district, which comprises the whole of the county of Derby and any farm lying within twenty miles of the county town, is the highly remunerative nature of milk, which the judges consider to have been "the salvation of the agriculture of the district" during recent bad seasons. The report furnishes a lengthy detail of each prize farm, and affords much interesting reading to the agriculturist. A "Report on Cheesemaking in Derbyshire," by George Gibbons, will be read with interest and advantage by dairy farmers. Reports on various departments of the Derby Show, the show prize lists, and like matters of interest to exhibitors and Members, fill up a number creditable alike to the liberality and enterprise of the Society.

Untersuchungen aus dem forstbotanischen Institut zu München.

Edited by DR. ROBERT HARTIG, Professor at the University of Munich. Published by Julius Springer, Berlin 1880, 165 pages, octavo. Price 14 Marks.

In the *Forst und Jagd Zeitung* for June there is a review of a book called "Researches of the Munich Institute of Forest Botany," by R. Hartig. The researches seem to have been principally directed to fungoid growths such as *Nectria cucurbitola* Fe, which grows on the bark of the spruce fir. An investigation of a different kind is into the nature and causes of "sunburn." One kind of sunburn, he says, is the drying up and dying of the bark on the southwest side of smooth-barked trees, and it is caused on trees which have been suddenly exposed to the direct heating of the sun's rays at Mid-

summer. Another kind of sunburn or split occurs in late winter and early spring at sudden changes of temperature, such as are common with a clear sky and east wind between day and night. There is then formed on the sunny side of the trunk close above the ground a vertical split in the bark right through to the *alburnum* wood. The reason of the splitting is only to be found in the unequal contraction of bark and wood on a sudden change of temperature.

The same Dr. Robert Hartig, Professor of Forest Botany at the University of Munich, has also investigated the bark disease of the larch, which for thirty years has puzzled foresters in Germany and Scotland. He attributes it to a parasitic fungus to which he has given the name of *Peziza Willkommii*. Its spreading is favoured by a damp atmosphere and want of draught. He gives, it is said, in the above-mentioned work, some valuable suggestions for the avoidance and repression of the disease.

Die Europaischen Borkenkaefer (The European Bark-beetles). By W. EAICHHOFF, Imperial Overforester at Muchlhausen, in Alsace, 315 pages, 8vo. Published by Julius Springer, Berlin, 1881. Price 10 Marks.

In the *Forst und Jagd Zeitung* for July there is a review of an important work on the Bark-beetles of Europe. The author says in his introduction that while endeavouring to be thoroughly scientific and critical, he tried still more to render his work of practical use to foresters. "*Bostrichus typographus* and its companions continued to nibble away almost undisturbed notwithstanding the valuable writings of Ratzeburg, which have hitherto served as almost the only guide in devising defences against the ravages of bark-beetles." The reviewer defends Ratzeburg to some extent

against this sweeping charge. He says that although Ratzeburg in his earlier works gives *typographus* one brood in a year or a year and a half, yet in his 1786 edition of the *Waldverderber* (The Devastators of the Forest) he says: "Time for development 8—10 weeks, but sometimes over three months according to the exposure and the weather. The whole brood is often developed in July, sometimes in South Germany even in June, and with favourable weather another brood will be brought out. A double generation takes place when, as is generally the case in Central Germany, the months from May to September have a mean temperature of 13°, 17°, 19°, 17° and 14° centigrade." Overforester Eichhoff attaches great importance to the new and careful observations made by himself and his assistant on the breeding habits of the bark-beetles, as also on the exact patterns of the feeding walks and breeding places which they nibble out under the bark. He has come to the conclusion that the bark-beetles have at least two broods every year and occasionally three.

The Conifers of Japan. By MAXWELL T. MASTERS, M.D., F.R.S., and L.S.

Of all the numerous interesting trees introduced to this country from the far-off Isles of Japan, the conifers form the most important section; as much from their economic uses as for their interesting habits and handsome ornamental appearance. In the excellent monograph on the Conifers of Japan, which is now before us, Dr. Masters gives a complete list of all that are known up to the present time, together with incidental remarks on their structure, affinities, synonymy, and geographical distribution. The latest and generally accepted arrangements of genera and species are adopted, the author having personally examined all the Japanese species except a few

of which he had no materials to work upon. The result is a clear definition of the many interesting forms of the coniferous family which are known to inhabit the islands of Japan. These, according to the author, comprise thirteen genera and forty-one species, of which only one genera is peculiar to Japan, viz., *Sciadopitys*, but no less than twenty-two of the species are supposed to be endemic, although this number is likely to be diminished as the flora of adjacent regions is explored. In speaking of the distribution of Japanese conifers the author says a word on an interesting fact:—"As to the occurrence of certain trees (often of peculiar organization) in the immediate vicinity of the temples in Japan, China, Tibet, &c., in some of these cases the trees are not known in a wild state, the aboriginal stock being either extinct or lurking in some of the old but unknown districts of the Chinese Empire, Tibet, or Central Asia. Among such may be mentioned, as worthy the attention of students of Buddhist lore, *Cupressus funebris* (China, Sikkim), *Abies Fortunei* (China), *Abies Kämpferi* (China), *Cryptomeria japonica*, *Sciadopitys verticillata*, *Ginkgo biloba*, and certain species of *Pinus*."

A fertile source of dispute is the variations assumed by many species of conifers during various circumstances and periods of growth, and we may conclude our notice of this admirable work by quoting the learned author's opinion on that controversial point:—"Mention has already been made of the various forms under which one and the same species occur. Carrière has called these transitional or immature forms 'larval' stages; and I have alluded to them under the head of Stasimorphy in my 'Vegetable Teratology.' In many cases the appearances depend simply on greater or less energy of growth at particular times. Arrest and progress of growth in more or less regular alternation and intermittence

will generally account for the diversity in form and arrangement of the leaves. The tufted leaves of the pines and larches indicate an arrest in growth of the axis; but it is very common to find a shoot elongating, and bearing leaves in scattered spirals. Sometimes these spirally-arranged and scattered leaves in *Pinus* are merely the bud-scales or 'perula' which have assumed a leafy development. Such leaves also have essentially the same anatomical structure as the ordinary ones. So, in the case of the *Retinosporas*, in the 'larval' state the leaves are free and detached from the stem, but in the mature plant the leaves remain in adhesion with or never separate from the stem, except at the tips. The internal structure of the various forms of the leaves in *Retinospora* and *Juniperus* is essentially the same, but more spongy in the faster-growing leaves. In *Libocedrus decurrens* it seems as if the axillary bud were also adherent to the stem, not at the organic base of the leaf, but at the point where the leaf becomes detached from the stem. This may be the result of an arrest of growth. But, if this be so, it is by no means easy to determine what causes the arrest or what stimulates the progress, particularly when these are confined to one or a few branches. Similarity of surroundings and outward conditions naturally engenders a similar disposition of parts; thus in the leading shoot of a *Picea* the leaves are in scattered spirals, while in the horizontal branches the spiral is so masked by the crowding of the leaves and the twisting that occurs at their base that there is a pseudodistichous arrangement, and the uppermost leaves are often shorter than the lower ones. In the leading shoot, in such cases, we have an analogous arrangement to what occurs in *Lycopodium*; on the lateral branches the arrangement suggests that of *Selaginella*. The interest attaching to these varied forms

of one and the same individual is enhanced by their suggestiveness in regard to the possible lineage of the species, a matter hardly more than broached. They may possibly represent the condition of some progenitor, or such a genus as *Retinospora* (so called) may be in course of formation."

The treatise is beautifully illustrated with woodcuts and diagrams of some of the more notable species, accompanied by two carefully-executed plates illustrating the characteristics of *Abies Veitchii* and *Picea polita*. All lovers of coniferous plants, and especially of those from Japan, should study this ably-written work.

The Indian Forester, Vol. VII., No. 1. Edited by J. S. Gamble, M.A., F.L.S., Calcutta.

The July number opens with a practical article on the raising and setting out of sandal plants, by Kad-Handi. The article is entitled "Sandal Planting in Mysore," and as the system followed is applicable to many other tropical plants which it is difficult to raise from seed and transplant with success, we make the following extracts for the benefit of our readers:—

"The seed is sown in tile-pots filled with soil, inserted close together in beds, and just covered with a mixture of sand and leaf manure. From then till the plants are transplanted, a year afterwards, the beds are kept constantly covered with old leaves, dead grass, or any litter at hand. The leaves and litter, if properly watered, decay rapidly, and require to be replenished at intervals of a few weeks. Last year this plan was tried in a few nurseries, and gave good results where persistently carried out. During the present season it has been followed in seventeen nurseries, in different hands, and in different parts of the country. It is easy to account for its beneficial effect: as a matter of observation it leaves nothing to be desired in the appearance of the nurseries. The portion of each nursery under sandal is shaded with boughs so as to afford a broken half-shade similar to

that in which sandal comes up naturally in thickets and hedges. Each tile-pot now contains a bunch of fine plants with the rich dark foliage of healthy sandal. There are this hot weather (1881) above a lac of tile-pots stocked with sandal, and in many nurseries it would be difficult to find an empty pot.

"Let us pass now to the planting out and management of the tap-root. In young plants the tap-root is usually longer than the height of the plant above ground. It is very sensitive to injury, and this was the cause of the failure of the early attempts to plant sandal. If cut so as to only remove two or three inches, leaving ten inches above perfectly undisturbed in its pot, the plant will usually die. The plan now adopted to keep the tap-root of manageable size is to have a layer of bits of broken tile strewn so as to lie flat at the bottom of the tile-pots, much as one pots a plant in a flower-pot, and doing so may be presumed to afford the same advantages in the way of drainage. By this means the tap-root is stopped growing down more than ten inches, the depth of the tile-pots; it divides and accommodates itself within the tile-pot; lateral roots develop, and we obtain a form of root suitable for planting.

"Transplanting begins as soon as the ground is thoroughly moistened by the first rains; it takes usually about ten inches of rainfall to do this. The tile-pots are lifted and carried to the newly-filled pits. One tile is gently removed, and the cylinder of earth and root resting on the other tile slipped into the ground. The earth is filled in, and the remaining tile, gently pushed back from the roots it has protected and confined during the past year, is pulled out, and goes back with the return coolies to the nursery to be re-set, and begin its work again. Watering should be stopped in the nursery a day or two before the tile-pots are taken out, so that the earth cylinders may be as hard as possible, and the transplanting rules provide for a little watering, for a day or two after the plants are put out. It is worth noting that the best planting—the minimum of root disturbance—is during the driest weather (for the season), a curious adaptation to the weak point of the climate. In Mysore, during the past season, two and a half lacs of plants were put out from tile-pots, at a saving

of 15 rupees per 1,000 plants. Of this, 5,000 odd were sandal, and the percentage of hot weather failures among the sandal was 35 per cent. It must be remembered that this was the first year of sandal-planting on a large scale, and this figure will probably be much reduced in the future. As usual, nothing was spent on watering or weeding after the plants were put out. Repeated failure is not a very serious matter on these terms; Rs. 5-8 per 1,000 plants represent the cost.

"Each tile-pot contains usually more than one sandal plant, sometimes as many as half a dozen, depending on how the seed comes up. There is thus a survival of the fittest for rot, grubs, and the first hot weather to work on; and then, when space is required for growth with the first monsoon after planting out, all but the best plants in each pit are cut out."

The conclusion of Mr. Thompson's "Report on the Forests of Mauritius" contains much prudent advice as to the protection and management of the forests on that tropical island, where it is a matter of the most vital importance that a due balance should be maintained between the cleared or cultivated land and that clothed by trees. In the parts of the island from which the natural forests have been cleared, and no attempt made to renew them, the water supply is fast failing, and will quickly bring in its train all the evils attending a thirsty land and parched climate. The suggestions made in the report will certainly go a long way to ward off these evils if the matter is at once taken in hand and pushed on with energy.

In "Plantations at Kuch Behar" the writer states that teak trees raised from seed sown in 1874-75, and planted out on proper soil, on a dry site, are now 50 ft. in height, and 2 ft. 9 in. in girth; while others raised and planted at the same time, but on a flat and ill-drained site, "are stunted and of little promise." Sissu and Khair (*Acacia catechu*) have thriven or failed in a similar manner, according as they have received the treatment

most conducive to their welfare or otherwise.

Extracts from correspondence in the *Indian Tea Gazette*, and other sources, make up an interesting article on "Trees as a Protection from Hot or Violent Winds." In the next paper some instructive remarks are made by "Native Forester" on the "Effects of Forest Denudation on the Deccan Side of the Western Ghats," in concluding which he bears emphatic testimony to the valuable services rendered to Forest Conservancy in India by Sir Richard Temple, Bart., late Governor of Bombay, in the following words:—

"During the time Sir R. Temple was at the head of the Bombay Government he not only earnestly employed himself in putting forest administration in the Presidency on a more sound footing, but quietly endeavoured to impress on the mind of the native administrations the desirability of protecting their jungles from further destruction, by helping them in every way possible. He visited their forests at all seasons, and offered suggestions on their future management, as if to secure their attention to the important question of forest conservation; and he seemed so far convinced of the practical truths of forest science that he left nothing undone, even at the sacrifice of personal comfort, to give effect to his views."

An official paper on "Reh or Alkali Soils and Saline Well Waters," by Dr. Center, Chemical Analyst to the Government of the N.W. Provinces, occupies fully twenty-one pages, and is an excellent *résumé* of the subject. In treating of the various methods by which saline soils may be improved and rendered suitable for cultivation, the author says:—

"The plantation of trees is also proved to be a very efficient means of cure. The khar is well known as capable of flourishing in such soils. They not only assist in moderating excessive evaporation by shade, but they also absorb and remove a certain amount of salt from the soil. As the alkali exists

chiefly in the surface soil, and in much less amount at a small depth, trees may grow readily where annual crops could not. The latter have their rootlets only in the surface soil, and are poisoned by the excess of salt, while the roots of trees extend deeper into less saline ground; also plants not only consume portion of the salt, but they prevent its concentration on the surface. A most conclusive experiment made near the Western Jumna Canal by the Irrigation Department is reported by Colonel Fulton. A piece of utterly useless reh land, for which revenue was remitted, was taken up by the Department, and planted with kikar trees. These flourished, and a very fine crop of doab grass, two feet high, came annually up under the trees, and the efflorescence disappeared. The villagers seeing that the land was improved, and fearing it would be alienated by the new settlement, applied for the restoration of both trees and land, and carried their point in the courts of law. A few days after the restoration the wood was sold to a wood merchant, and every tree cut down. At present the doab grass is all gone, and the soil is encrusted with salt. Such an experiment made among American farmers would have excited the keenest interest and given rise to numerous trials of the same."

A friendly review of the *Journal of Forestry* (with the customary ill-natured kick at English and Scotch foresters, and the regulation praise of the superiority (?) of Continental foresters and forestry), extracts from official and public papers, letters to the editor on local subjects, and extracts from the Indian Gazettes, affecting the Forest Department, complete a number of more than average merit and general interest.

A brief but interesting account of the Forest School, established by the Indian Government in 1878, at Dehra Dún, forms the subject of the opening article in the October number of our Eastern contemporary. The scheme has already attained a considerable success, and must ultimately become of the

greatest possible advantage to the Indian Forest Service, if it is conducted on energetic and enlightened principles. An article on the development of the trade in Indian woods in the English market will be read with much interest by all concerned in the use of high-class timber. Indian produce has already obtained a high repute among cabinet-makers, and high prices are readily given for a really first-rate article. 2888

"Sub-surface Moisture in Connection with the Question of the Deterioration of Culturable Soil," by Captain Hall, R.E., enters elaborately into the drainage question, and advocates the advantages of a system of "sub-surface" drainage as a remedy against many of the diseases which afflict humanity in tropical countries, and especially as an effective method of preventing the extension of "reh" or saline lands. The paper is illustrated with several useful diagrams, explanatory of the text, and contains abundance of suggestive matter of deep interest to sanitary authorities, and others engaged in drainage and in the reclamation of saline soils.

Official papers on the "American India-rubber Trees at Nilambur," and the discussion in the Legislative Council on the "Burma Forests Bill," with the usual reviews, official gazettes, and miscellaneous articles, complete a good number.

OUR FOREIGN EXCHANGES.

IN the *Revue des Eaux et Forêts*, M. de Vasselot, Inspector of Forests at the Cape of Good Hope, gives the following account of the Crown forests of that colony. The charge of these forests pertains to the Ministry of Crown Lands and Public Works. They occupy an area of about 1,200,000 hectares, or 225,000 acres, but 100,000 Imperial acres only are in the condition of timber forest, the remainder consists

of firewood in the condition of coppice of mediocre quality. The timber forests contain many good kinds of trees, of which two are remarkable for their qualities. There are more than seven or eight millions [of hectares ?] of land belonging to the Crown, situated in mountain regions, which are absolutely fit for nothing but reboisement. What a field for work !

"In the rude forest service which exists there are six or seven special agents in correspondence with the Commissioner—or it may rather be said more correctly supply to him once a year or so an account of moneys received by them for licences granted by them to fell trees. At places too remote for these agents to include them in their circuits, these are granted by Civil Commissioners. There should be at least seven distinct and well-organised great forest services, in which the chief official may carry out the administration ; but the Government, if it be disposed to recognise the utility of the conservation and restoration of the forests, has to take into account the financial condition of the Colony, and the local requirements"; and then follows an account of the civil and political constitution of the Colony, and of the lack of satisfactory means of inter-communication between different parts of the country.

The last issue of the Italian *Nuova Rivista Forestale* is taken up with an account of *Lo Strumento Universale di Ertet*, and illustrations of the applications which may be made of it. It is a portable instrument which may be employed to determine angles, heights, levels, and relative distances of any locality. Wherever used it has been designated a universal instrument.

From Denmark has been received a valuable statistical report on the forests, forestry, and forest products of that country. It is entitled *Omvidet af en dansk Skovbrugsstatistik*, by

Dr. P. E. Muller, Professor of Forest Science in the College of Agriculture, Forestry, and Rural Economy in Copenhagen. It is a reprint of the last issue of the *Tidskrift for Skovbrug*, with additional observations by Professor Müller and Mr. S. Thalbitzer, and charts illustrative of the geological formations and of the distribution of different kinds of trees in Jutland and the Danish Isles.

JOHN C. BROWN.

TIMBER TREES—CULTIVATION AND CONVERSION.

MR. J. J. HARLE, M.R.A.C., agent to the Earl of Ducie, lately delivered a lecture on this subject before the Royal Agricultural College, in which he said :—The varieties of timber trees are too numerous for me to notice in this short lecture, but I have made a few notes of the sorts generally grown, viz., oak, ash, beech, and elm, and of the conifers, larch and Scots fir. Of these sorts the oak is the slowest grower, but is the most valuable, and makes the toughest and most durable timber when fully matured. In the earlier stages of its growth, under thirty years, the timber rots very quickly, and is inferior to larch. Oak timber is most suitable for all woodwork exposed to the weather, such as gates, gate posts, outside door lintels, &c., and all work that requires to be of a lasting nature, but it is a tough and expensive wood for fine joinery work. Oak trees are generally cut in May, when the bark is fit for stripping, as it is very valuable for tanning purposes. The cost of stripping is 22s. to 25s. per ton of bark, and an extra sum for felling the trees. The present price of bark is about £4 10s. per ton, so that the profit from the bark may be considered to add at least 4d. per foot to the timber, which fetches at present from 1s. 9d. per foot for

ordinary-sized timber, to 2s. 9d. for large, clean trees. The ash differs from other trees in being tougher and of better quality in its early stages and when quickly grown on good soils. Its timber is very tough and elastic, and most suitable for waggon shafts, handles of implements, &c., and when cut as coppice wood is the most suitable wood for hurdles, hop poles, &c. The price at present is 1s. 6d. to 2s. per foot. The beech is a very hardy tree, and grows well on thin limestone soils in very exposed situations. The timber is not very valuable, being short-grained and brittle, and is not suitable for exposure or durable work. It is chiefly used for furniture and cog-wheels of machinery. The present price is 10d. to 1s. per foot. The English elm is our commonest hedge-row tree, and grows very freely and to a great size, especially in the Severn valley. The wood is close-grained but not tenacious, and is very useful for sides and bottoms of waggons, wheelbarrows, &c., and is largely used for making shallow boxes to carry tin plates for America. The present price is 9d. to 1s. per foot. The wych or Scotch variety of elm is much tougher, and resembles ash timber. The larch is the most profitable tree grown in this country, although the disease to which it has been subject during the last few years has checked its cultivation. It is a very quick-growing tree, and one of its most valuable points is that the timber of even young trees is tough and durable. The thinnings of ten to twenty years old make very good rails for fences and props for pit work, whilst at forty or fifty years old the timber is very suitable for roofing purposes, although more liable to warp than foreign timber. Its price is only 10d. to 1s. in the South of England, but in the North it fetches much higher prices. The Scots fir is a very hardy tree, and most suitable for giving shelter on high, exposed

situations, and acting as nurses to more valuable trees, but the timber is soft and not very valuable. The best method of selling timber is to mark off the trees into convenient lots with white paint, and sell them by auction when standing, so that you need not cut them down if the reserve price is not reached. In estimating the reserved price, the height and quarter-girth of the trunk of each tree must be estimated, and its value per foot of timber; whilst the tops are calculated to pay the purchaser for the cost of cutting. Large-sized timber can generally be cut down and dressed for 6s. to 7s. per 100 feet. In making a new plantation, the most profitable method is to plant hardwood trees of oak and ash at 12 to 20 feet apart, filling in the intermediate spaces with larch at 4 feet apart, and if the situation be exposed an outside belt of Scots fir may be necessary. The larches are gradually thinned out, until at 50 years old the hardwood trees alone remain, and grow to maturity at 80 or 100 years old. In the North of England, the large timber trees alone are valuable, but in the South coppices are grown for faggot wood, &c., and pay very well. These coppices are cut every ten years, and yield nut and maple wood suitable for chairs, birch wood for brushes, besides faggots, pea sticks, and hurdle stakes: if allowed to get a few years older, ash for making hurdles, and timber suitable for pitwood, can be obtained. The work of cutting, &c., is generally done by piecework, and in my district the cost is as follows: 8s. per 100 for cutting and tying up faggots, and 2s. 6d. per ton for pitwood. The prices obtained at present are 12s. to 13s. per 100 faggots; 9s. per ton for nut and maple wood 2 or 3 inches diameter; 10s. per ton for pitwood, beech, &c., 5 or 6 inches diameter; 6s. per ton for birch; and 8s. per ton for alder. In certain cases the coppices of seven or eight years'

growth are sold to persons for £3 or £4 per acre, who pay all the expenses of cutting and marketing, but the objection to this system is that the stools are more liable to be roughly cut off, which checks the future growth.—*Agricultural Gazette*.

A SUGGESTED NEW AGRICULTURAL RESOURCE.

MR. A. J. MAULE, of the Nurseries, Stapleton Road, Bristol, has published an experimental treatise on the *Yucca gloriosa*, or Adam's Needle, as a sugar and fibre-producing plant, which cannot fail to interest British agriculturists, landed proprietors, &c., who would be only too grateful to any person who would now point out to them some means of improving their prospects and profits from the soil—profits which in many cases are simply *nil*. Mr. Maule believes that the *Yucca* may be cultivated in this country with commercial success, while affording employment and light field-work for many hands; 6 lb. of the leaf of the plant producing 1 lb. of fibre and 1 lb. of sugar, the former being superior to New Zealand flax, and capable of being woven into a material almost equal in fineness to Japanese silk. To the treatise are appended two testimonials, one from Messrs. Terrell and Sons, rope and twine-spinners, and another from Mr. Bond, of the Redcross Brewery. The former, who have tested the fibre, bear witness to its value commercially, if a continuous quantity could be secured at a moderate cost; and Mr. Bond, in sending the author a small cask of beer brewed from the saccharine extracted from the *Yucca* by Mr. Maule, pronounces it excellent. "It will not keep long (he adds), as from its crude state it contains much vegetable matter; but on testing it by the saccharometer, I find it registers two degrees more saccharine than others." Thus, two

most important articles, for the supply of which we are mainly in the hands of foreigners, Mr. Maule considers we can have at home. "The great Creator," he writes in a note which accompanies his pamphlet, "has made the world round, no doubt for the purpose of giving all living things a chance, and what they get in the tropics from heat I get from cold."

The *Yucca* rather likes a high and dry situation, to enable it to avoid too much moisture, and is planted in rows on ridges similar to mangel-wurzel.

"When once the plantation is made, there is no further trouble in digging or ploughing as with other crops, only to be kept free from weeds, and, perhaps, a little top-dressing occasionally may assist them. The previous summer's leaves are stripped off about February, but may remain on until wanted, and used through the spring as the market may require. This season is recommended for reasons hereafter mentioned, as the frost in winter playing on the foliage causes the secretion of sugar. The constant stripping off the foliage does not appear to affect the strength of the plant in the least. When I began the experiment to extract the fibre, I thought the decomposition in water, as the flax is treated, too tedious; so I resorted to boiling, and after boiling a few leaves for one hour (an experiment any one may try), I rinsed the leaves as you would a towel, laid them on grass in the open air to dry and bleach. I then found the liquor very clammy and sticky, giving off an aroma like malt and hops, and feeling certain there was a large amount of saccharine, I kept it gently simmering, when to my surprise I found an abundance of syrup of sugar. I extracted a still further quantity, and sent it to a brewer, when it produced an excellent glass of beer, and proved in its crude state, as sent in, to

possess 2 per cent. more saccharine than the foreign sugar under the test of the saccharometer. It has been thought by scientific men that sugar cannot be grown in sufficient quantities in this country to pay, for the want of sun, and no doubt it is true as regards a summer-growing plant, but if you find a plant whose nature is saccharine that will stand frost, it gets a greater sugar-making influence from cold than it does from heat, there being no difference in the effect of extreme cold and extreme heat on substances and vegetation that are capable of enduring. The farmer turns up his land in summer to receive the benefit of the sun, and he does the same thing for the winter's frost—both of which have the same effect."

In fact, he asserts cold and frost operate on the leaf of the *Yucca* as the sun does on the cane, and produce more saccharine here than in the tropics.

Altogether, the idea started by Mr. Maule (who is quite a horticultural philosopher) is very interesting, and may be very important. Fancy thousands of acres of land in England laid out in *Yucca* plantations—half the island bristling with Adam's Needles—*breeching and beer-ing* the population from what has hitherto been considered only a garden ornament!

CHINCHONA IN JAMAICA.

THE Government plantations of chinchona have recently been shown, by official accounts and other details published in the *Jamaica Gazette*, &c., to have resulted in undoubted success, the bark grown in the island selling readily, and fetching in most cases prices higher than Ceylon or East Indian products. From one of the sale accounts, published this year, it appears that the sales of the preceding fifteen months resulted in £8,167 ls. 8d.,

from 41,696 lb. of dried bark shipped. There is little doubt that this satisfactory issue is mainly, if not entirely, due to the skill and perseverance of Mr. D. Morris, the Director of Public Gardens and Plantations; and this gentleman must feel a special pleasure in finding that his Government, so far from wishing to follow precedent by monopolizing the remunerative industry, is doing its best to attract workers and capital from outside for its further development.

Announcements have been made in the Kingston papers of August last that the Jamaica Government offers to make grants of public lands, through the Director of Roads, to persons willing to embark in the enterprise. The situation of the land is not mentioned; but it is assumed to be the extensive unopened tracts of forests on the higher slopes of the Blue Mountains, some forty miles from Kingston. These lie at elevations of from 4,000 to 6,500 ft., and contain land of fine quality; they are, of course, as yet, without roads, but have a delightful climate. It is stated that the governor himself has devoted both land and capital to chinchona planting. The grants are to be made subject to payment of purchase money at public auction, at the upset price of 2s. per acre, and to covenant that not less than one-sixth of the whole quantity granted shall, at the expiration of five years, be cleared and planted with chinchona, and also to reservations as to public roads. On fulfilment of these conditions, the land will be transferred in fee simple to the grantee at the end of the five years. Government is also ready to supply seeds and plants. Seeds of *C. officinalis*, for cultivation at elevations above 4,000 ft., are procurable at 5s. an ounce, post free; and of *C. succirubra*, for elevations between 2,500 and 4,000 ft., at 3s. an ounce. An ounce is enough to produce 20,000 seedlings, which, with care, will plant five acres.

Boxes of seedlings are to be had at £1 ls. a box, and plants from 40s. to 60s. a thousand. Applications are to be addressed, with remittance in stamps or order on the Parochial Treasury, Kingston, to the Director of Public Gardens, Gordon Town; and it appears that the demand increases daily, and can hardly be met.

Independently of the practical proof of remunerative sale, there is confirmatory evidence of chinchona succeeding in the island, in the discovery by Mr. Morris of a hardy and thriving patch of *C. officinalis*—which produces the valuable “crown bark” of commerce—in a long-deserted plantation.

Mr. Morris opportunely publishes hints and suggestions for raising the plants from seed, and establishing plantations, both from his own experiences in Jamaica and the results of cultivation in India.

As the land on which chinchona can be grown is, at its lowest, 2,500 ft. above sea level, the restoration of the former commercial status of Jamaica, in the event of the industry continuing to prosper and increase, as seems most likely, will, curiously enough, be owing to the very tracts hitherto considered the most commercially useless in the island.—*Field*.

ANIMALS EATING YEW.

MR. J. R. JACKSON, of Kew, contributes to *Land and Water* the following interesting notes on this subject:—It is well known that the leaves of the yew are poisonous to animals, particularly to horses and cows, and they also act as a narcotic acrid poison on the human system, and this both in the fresh and dried states, for it is said by some that the foliage, after being cut from the trees, and dried, loses its poisonous property. On this subject I make the following extracts from the edition of Barton

and Castle's “British Flora Medica,” which I edited in 1877:—“The ancient Greek writers asserted that the Arcadian yew was destructive to those who ate of it, or slept under its shade. Dioscorides, Galen, and Pliny attribute to this tree the same noxious effects, but Theophrastus affirms that the fruit is not poisonous. Matthioli states that the yew trees which grew in the vicinity of Narbonne had a pernicious influence upon persons who slept under their shade. Caesar, in his ‘Commentaries,’ relates that Cativolcus, king of the Eburones, poisoned himself with the juice of the yew. Ray mentions that a gardener employed in clipping a yew tree which grew in a garden at Pisa was unable to proceed with his work for more than half an hour at a time without being seized with violent pains in the head. The Jesuit school affirms, moreover, that the branches of this tree plunged in a fishpond will stupefy and benumb the fish so that they may be taken with the hand. Matthioli relates from Theophrastus that ruminating animals eat the foliage with impunity, while others are killed by it. It seems, however, as I have before stated, to be generally poisonous. Deer, sheep, and goats have been said to eat of it without harm, but it is certain that horses, asses, and oxen are speedily destroyed by it, and it differs from many other plants in that the lopings or half-dead branches are equally pernicious with the recent leaves, and have been in most cases the source of accident. Several cases are on record of its virulent effects upon horses. One mentions that two horses were put under a yew tree, which they cropped with eagerness. No unfavourable circumstances appeared for three hours, when, having staggered a few paces, they both dropped, and before the harness could be taken off they were dead. Another case states that the lopped and withered branches which were

accidentally placed before a team of four horses were partaken of by them, and proved fatal a few hours afterwards. Baudin and Henon, of the Veterinary School of Lyons, gave six ounces of yew leaves to a horse. He fell dead in an hour, without convulsions." The following is given as an instance of the poisonous character of yew leaves upon the human subject. Dr. Percival relates that the fresh leaves were administered to three children of five, four, and three years of age, near Manchester, for worms. Yawning and listlessness soon succeeded, and the eldest vomited a little, and complained of pain, but the others expressed no sign of pain. They all died within a few hours of each other. The horses referred to as having been recently poisoned in Suffolk had previously, no doubt, steered clear of the yew hedge, or at all events had not been induced to touch it. The fruits themselves are poisonous, but the red fleshy cups which partially covers them are quite harmless.

TREES AND THEIR HABITATS, FROM A SANITARY POINT OF VIEW.

VERY near to London there is a patch of the old Kentish forest which has not yet been cleared by the pioneering builder. In the midst of this unsullied greenwood a pretty house stands, surrounded by a shrubbery, and it struck me that the shrubbery might be a pleasant place wherein to dream through a morning. So I bowed my head and tried to find out an open space amid the quiet of the low bushes. The laurels emptied their jewelled drops upon me, and a "soap-berry" bush twined a few lissom arms around me and left humid marks on my attire. But I found a quiet little open where I could just look easily over the heads of the lower

shrubs and watch the village slumbering in the deep hollow. The ground was a little soggy even in the open space, while underneath the darker and thicker plants there was a soft covering which made a squelching sound when the foot was placed upon it. Presently a certain heavy odour penetrated across the keen aroma of my tobacco, and I knew that I was feeling what Mr. Tennyson calls the moist, rich smell of the rotting leaves. It then struck me to look at some of the tiny pools of water that had not managed to drain away into the earth. The point of a stick sharply applied to the bottom of these pools brought up certain round and silvery bubbles that glittered for an instant and then broke with an insignificant sound as of a single "tick." The shrubbery embraces the house very closely, so that the happy tenant has an excellent miasma all to himself, and need never think of going to the Pontine Marshes. This will encourage native industry.

The rotting leaves smell very moist, but the richness discovered by the Laureate did not seem so obvious, for hydro-carbons are being generated in those tiny glades. If you placed a large gas jar over a heap of the brown, damp mass during only one day the contents of the jar would either put a candle out at the day's end, or would give a single bright flash when a light entered the cavity. Methylic hydride is formed in awkward quantities. We make statutes to protect our miners from the effects of hydro-carbons and carbonic anhydride, while we cheerfully make those compounds in our gay shrubberies, and let them season the air of our drawing-rooms. In the forest the same thing was to be seen. The rough leaves of the elm were glittering with damp, the brown arms of the planes were shining, and the early beech-mast was falling to rot and germinate. Not a conifer was to be seen saving the one solemn

cedar on the lawn, and the dry, delicate carpet underneath this cedar might surely have taught lessons to the owner of the shrubbery. But the coniferæ are not approved very much by those who superintend the planting of private grounds and public parks. Three miles from the squelchy shrubbery I saw a magnificent cedar growing in dark richness on another lawn. No finer tree could be seen in all Kent, and yet it was planted right over the London clay. How was this managed? The conifers must have a light soil, because their delicate radicles cannot, push through clay with that robust steadiness which characterizes the roots of the elm and oak.

But there is no difficulty about making such a soil. The superb cedar which I saw was planted in a kind of huge tank made with concrete. This tank was filled with prepared light soil, and the cedar is enabled to feed itself with silicates without bruising its spongeoles against an impassable wall of clay. The same thing could be done at a small cost in a hundred other places where at present the elm and the beech and the oak shed their showers on the earth. London especially would benefit if copses even of *Pinus sylvestris* were planted in the open spaces where people go for pleasure. It is to be feared that conifers will never thrive well in the actual heart of the town. Many people fancy that the stomata of the trees become clogged by the black dust, and that respiration thus becomes impossible. But the real reason is, I fancy, somewhat farther to seek. I have found that the coniferæ require less carbonic acid than almost any other description of forest tree, and so they die in town, not so much from the clogging of the stomata as from excess of carbonic acid. It would seem as though the plants were unable to select their nutriment, and I have decided that the evil which causes the trees to droop arises from the

gases absorbed. *Pinus pinaster* will thrive heartily on a bleak foreshore where the spray lashes nearly to its roots, but it dies when transferred to a large town. Yet there is no reason whatever why pine groves should not be planted on prepared soils round about London and other great towns. The trees have an inestimably beneficial effect on health. The strong man who remains among them for a while gets residual air of a pure and delicate sort into the lung cells, while one who has weak lungs breathes with ease.

It is as though the air took on a silken quality from winding its course amid the dainty needles. The reason is not very obvious, but may be found out by a simple test. If sensitive starch-paper be placed under an arch where fir branches meet thickly the paper shows a definite reaction, for the air is ozonized. One who breathes it is really breathing a life-giving fluid, and that is why an invalid's map of Europe would be coloured in the very spots where the conifers grow best. It is unwise to leave anything important to the intelligent mercies of vestrymen and boards of works, but surely sensible people will begin to advocate the planting of firs in England instead of the trees that are so little useful. It may be asked whether the miasma generated among the fallen aciculate leaves of the pine is not as dangerous as that which slumbers in the hollows of fashionable shrubberies. The absence of generated gases is just the very cause that makes the *débris* of a firwood delightful to the tread. The leaves have a very large quantity of sclerogen and lignine, and a very small quantity of cellular matter. Six months after a needle has fallen the chlorophyl will have gone, but the real frame of the leaf will remain, and the shape is almost perfect. Look at the stripped leaf which has fallen from an elm and lain long in a ditch. A weavery of fairy fibres can be seen

with such great gaps in the meshes as show the quantity of cellular matter that has been macerated off the framework. There is no such maceration possible with the fir needle, and that is why the brown carpet of silk-coated spears is so good to see and so harmless to smell. We are getting rational in a great many matters that pertain to health; perhaps by-and-by we may grow rational in our sylvan efforts, and take to growing healthy trees and plants to add health to beauty.—*Morning Post.*

TREE PLANTING IN IRELAND

WRITING to the *Times* on the 12th ult., Mr. George Orme Malley, 26, Upper Temple Street, Dublin, makes the following remarks on this important subject:—"The suggestion of planting trees in suitable localities throughout Ireland deserves the attention which any subject referred to in the columns of the *Times* is sure to command. The danger is that, if law and order should be re-established in Ireland—of which I and many others who have opportunities for forming correct opinions have no doubt—abortive attempts should, as in the case of waste-land reclamation, be made through inexperience, want of knowledge of the locality, or reckless improvidence. In considering the suitability of localities, nothing is more deceptive than the appearance of a country in the absence of the evidence of an existing foliage. In Ireland as well as in Switzerland no soil is more suited for planting than a rocky one. The familiar lines from 'Childe Harold' are especially applicable here, as the fir-tree grows—

Loftiest on loftiest and least sheltered
rocks,
Rooted in barrenness, where nought be-
low

Of soil supports them 'gainst the Alpine
shocks
Of eddying whirlwinds, yet springs the
trunk, and mocks
The howling tempest.'

The bogs of Ireland, especially the deep red bog, if deprived of surface water by a cheap system of drainage, will nourish vigorously the spruce, larch, Scotch and black Austrian firs, together with holly, laurel, and magnificent rhododendrons, for undergrowth. Witness the experiments in Connemara by Mr. Mitchell Henry, M.P., the late Mr. Plunket, and others in Achill and Ballycroy, on the shores of the wild Atlantic, the plantations of the late Colonel Clive, M.P., and Mr. Pike. In Sligo and Donegal similar proofs of the adaptation of the soil and climate abundantly exist. In Achill geraniums and other greenhouse plants have been cultivated in the open air by the above-named gentlemen, and have been left out during the whole winter. The Mediterranean heath flourishes magnificently at Mulranny, beyond Newport, and at Carramon Lake, beyond Bangor, in Ballycroy, and grows in both places to the height of five or six feet, thus indicating the mildness of the climate and the productiveness of the soil. In the neighbourhood of Foxford the land only requires to be enclosed, and the natural timber protected from the depredations of goats and cattle and the old roots immediately throw out suckers, and the bog willows and alders spontaneously spring up. The traveller on the railway between Foxford and Ballina can see this on the properties of Lord Arran and Sir Charles Gore. I have personally experienced the advantage of planting, and regret, when times were quiet and more lands in my hands, I did not extend my operations further in that direction. In connection with waste land reclamation, planting trees for shelter would be essential, or rather indispensable, as

I have frequently pointed out. The 'nakedness of our land' in respect of foliage is its most melancholy feature, and I need not dwell on what is so well known to every practical farmer, that nothing nourishes the winter grasses or improves outlying stock so much as tree shelter, especially spruce, fir, or other evergreen or non-deciduous trees."

A splendid opportunity is here pointed out, how to confer an incalculable benefit upon Ireland, by the general planting of waste lands for

the growth of timber as well as for shelter and ornament to the bleak, bare, and treeless tracts which are such an ugly blot on the fair face of the country. However, Mr. Malley requires a word of caution against planting larch on bog of any description, where it invariably proves a failure. There are abundance of suitable trees for bog planting, but larch is not one of them. The rocky slopes of mountains are the natural home of the larch, and where it is found to thrive best, and produce the most valuable timber.

DEATH OF THE HON. J. K. HOWARD.

THE Hon. James Kenneth Howard, one of her Majesty's Commissioners of Woods and Forests, who had been ill for some time, died on Saturday evening, January 7th, in the 68th year of his age, at his residence, Hazelburg House, near Newbury, Hampshire. The deceased gentleman, fifth and youngest son of Thomas, sixteenth Earl of Suffolk, by his marriage with the Hon. Elizabeth Jane, eldest daughter of James, first Lord Sherborne, was born in 1814, and educated at the Charterhouse. He was intended for the diplomatic profession, and for a time occupied the position of a *précis* writer at the Foreign Office (from 1835 till 1841), when he was private secretary to the late Lord Palmerston, and for a short period was a Groom-in-Waiting to her Majesty. From 1841 till 1852 he sat in the House of Commons in the Liberal interest as representative for Malmesbury, a constituency in which the Suffolk family divide political influence with the Earl of Radnor, and which was but lately represented by the ill-fated Mr. Walter Powell. In 1855 he was appointed by Lord Palmerston one of Her Majesty's Commissioners of Woods and Forests, an office which, in conjunction with the Hon. Mr. C. A. Gore, who has held office since 1839, he filled till the time of his death. The value of the post is £1,200 per annum, and is in the gift of the First Lord of the Treasury, the Commissioners of Woods and Forests acting under the control of the Treasury.



HISTORIC TREES IN AMERICA.—There is a grove of nearly 1,700 trees in California, no one of which measures less than 6 ft. in diameter. At Salem, New York, there is a white oak, the branches of which spread over 112 ft. In Berks, Pennsylvania, there is a chestnut tree which measures 40 ft. at the base; and at Showhegan, Maine, there is a russet apple-tree $4\frac{1}{2}$ ft. in diameter, with branches covering a space 63 ft. in diameter. Then there are the historic trees, *par excellence*, some of which have now disappeared, as the Charter Oak. —*American Magazine of History*, November, 1881.

THE DESTRUCTION OF TREES IN STORMS.—The storm of October 14 and 15, says a German contemporary, committed great havoc in the Thiergarten, Berlin, where 231 trees were blown down, or so severely injured that they had to be felled. Since December, 1869, there has not been so great a destruction of trees at Berlin.

CHINCHONA BARK.—The Java process of shaving the bark of the chinchona, which was introduced into Darjeeling by Dr. King, has proved a decided success. The bark renews itself within about a year, and the trees do not appear to have suffered the least check.

OBITUARY.—We regret to announce the death of Mr. Charles W. Ormiston, partner in the well-known firm of Ormiston and Renwick, seedsmen and nurserymen, Melrose, which took place on January 14, at the early age of 21.

A LARGE OAK TREE.—In the *Deutscher Garten* there is a description and figure of a gigantic oak tree, the Königseiche, or King's Oak, of Pausin. This fine tree, though still standing, is dead. At forty inches from the ground the stately trunk is about 9 metres, or nearly 30 ft., in circumference. This tree is regarded as one of the very primeval oaks in existence at the present time. — *Gardener's Chronicle*.

TREE PLANTING IN NEBRASKA, 1880.

—There were planted in Nebraska during the year, as shown by returns, fifty-three million ninety-two thousand and eighty-eight forest trees, two million four hundred and forty thousand and forty-six fruit trees, four hundred and sixty-four thousand four hundred and twenty-six grape vines.

THE CEDARS OF LEBANON.—The British Consul-General at Beyrout informs us that steps have been taken by Rustem Pacha, the Governor-General, for the protection of the cedars of the Lebanon. A notice has been issued, which will serve for the guidance of future travellers who propose to visit these venerable monuments of antiquity.

LOMBARDY POPLARS KILLED BY FROST.

—The winter of 1880-81 has been very destructive to the Lombardy poplars in the counties of Norfolk and Suffolk; probably more than half the trees are dead, and of the remainder many, although showing feeble signs of vitality, will evidently not long survive. Some curious phenomena present themselves with regard to the trees which have partially survived, and the apparent capriciousness with which many of them have been spared. For instance, some trees in very exposed situations are comparatively uninjured, whilst others, sheltered from the wind, are quite dead; one particular tree in a row may be still living, but all the others have perished; or again, in many of the trees which still show signs of vitality it is on the south side only that they have put out leaves. The latter circumstance would seem to indicate that the north wind was the cause of the mischief; but the number of trees which have perished in sheltered situations shows that this certainly was not the only cause. — *Land and Water*.

BEAUTIFUL VINES.—The artistic gardener would, at this season, do well to make note of a few of the really

beautiful vines—we mean those worth growing for the simple beauty of their leaves and shoots alone. The American hardy vines are very fine, and there is a handsome one called *orientalis*, which deserves a place against a wall or scrambling over a low tree. There is also one called *odoratissima*, which is very fresh in scent in spring. Humboldt's vine, which has an immense large leaf, turning claret-red in autumn, is also worthy of a place against a tree or elsewhere. These plants should be placed in positions where they will require no great care. In fact, we saw one the other day running about on the ground in a shrubbery, the outermost shoots crawling up the adjacent tree, the effect of which was very fine indeed. There can be no kind of difficulty in their cultivation, except that nurserymen may sell old snaggy plants that will not grow freely. There is no great sale for these things, and very likely one may get a thing in a pot or with a stumpy root that will not go ahead when planted. The best way is to get a few eyes and strike them for one's self. With vigorous young plants there can be no failure.—*Field*.

FINE TREE DESTROYED.—The severe gale on the morning of Friday, the 6th of January, blew down and destroyed a very fine specimen of the Douglas Fir (*Abies Douglassi*) growing in the Arbour Low, to the north-west of the Mansion House. The tree, although only thirty years of age, had attained the height of 60 ft., with a girth of 5 ft. at the height of five feet from the ground.

ALTRE WOOD SALE.—This sale took place on Monday, the 16th January. The wood consisted principally of hardwoods. There was a good attendance of wood merchants, boat-builders, country carpenters. Oak per cubic foot sold from 1s. to 2s.; ash,

1s. 3d. to 2s. 2d.; elm, 1s. 3d. to 1s. 6d.; beech, 10d. to 1s. 2d.; larch, 10d. to 1s. 2d.; burn wood, 10s. to 12s. per ton. The principal purchasers were Messrs. Wilson and Son, Forres; Menzies and Son, do.; Bain, do.; Sime, Rafford; Findlay, Burghhead; Asher, do.; Main, Hopeman. Messrs. Ross and McPherson were auctioneers, and disposed of upwards of 300 lots in less than three hours.

TREE GUARDS.—Messrs. William Miller & Sons, of Wolverhampton, have received a large order for tree guards required by the corporation of the city of Rochester. The same firm secured the contract for the fencing and gates required by this corporation for the Vines Park in the early part of this year.

EFFECTS OF SMOKE ON TREES.—A recent investigation by Herr Reuss, of the injury done to trees by the smoke of smelting works in the Upper Hartz regions, yields the following among other results. The smoke is injurious mainly by reason of its sulphuric acid. All trees are capable of absorbing a certain quantity of this through the leaves, whereby they are rendered unhealthy, and often killed. Their growth in the smoke is irregular and difficult. Leafy trees, especially the oak, resist the smoke better than the Conifers. No species requiring humus or minerally rich soils prosper in those regions. The oak seems really the only tree that can be successfully grown. Trees that have been injured by smoke are not exempt from injury by beetles. All smelting authorities should unite in effort to prevent this injury to vegetation. By instituting sulphuric acid manufactories, effecting condensation of the smelting vapours, the evil may be greatly reduced and brought to a minimum. Places cleared of vegetation by the smoke may be brought under cultivation again after removal of the injurious cause.

THE JOURNAL OF FORESTRY & ESTATE MANAGEMENT.

THE FOREST OF DEAN.

(Concluded from page 699.)

ABOUT the year 1712 the forest was probably in its best state, as in the Commissioners' Report of 1788 they refer to this time, and deplore the subsequent falling off. The extension of the forest coal-works effected a change in the kind of timber required for propping the mine; cordwood and loppings would no longer bear the strain on galleries now worked at great depths, trunks and main limbs were required. In 1735 a report says: "A practice has prevailed among the colliers of boring large holes in trees, that they may become dotard and decayed, and, as such, may be delivered to them gratis for the use of their collieries."

In 1758 a survey was made, when 27,302 loads of timber fit for the navy, 16,851 loads of about 60 years' growth, and 20,066 loads dotard and decaying were found.

In 1763 Mr. Pitt reports "that great spoil had been committed." In 1783 the forest contained 90,382 oak trees, amounting to 95,043 loads, besides 17,982 beech trees, in which were 16,492 loads. The records of this period abound in tales of plunder and encroachments, and at last, in 1786, 26 George III., commissioners were appointed to inquire into the state of the woods and forests of the Crown, and certain matters of Inland Revenue; they presented no fewer than seventeen reports on various subjects: hence the long delay which took place in rectifying the abuses.

In 1808 the Government appears to have commenced in earnest and an Act was passed confirming the original power to enclose 11,000 acres, and legalizing the enclosures of Buckholt, Staple-edge, Birchwood, and Acorn Patch, formed a few years previously, and making it felony to break down the fences. Six commissioners were appointed, of whom Lord Glenbervie, Surveyor-General of woods and forests, was chief, with Mr. Machen as Deputy Surveyor, and Mr. Milne as Secretary. The existing enclosures owe their formation as well as their present promising condition to their labour. Great pains were taken to ascertain the best methods to adopt for the rearing and planting of trees. "The space of nearly one hundred years must

elapse," writes his lordship, "before the success or failure of any plan adopted in the cultivation and management of oak timber for the navy can be clearly ascertained, during the whole of which time a persevering attention and uniformity of system in the execution of the plan adopted would be equally requisite through perhaps three or four generations."

On 23rd July, 1808, the following general principle was agreed upon, viz., "to plant an intermixture of acorns and oak trees, with a very small proportion of Spanish chestnuts, so that if either the acorns or the young oaks should succeed, a sufficient crop might be expected, and to plant no trees of any other sorts, except in spots where it should be thought that oaks would not grow, and which it might be necessary to include, in order to avoid the expense of fencing, or for shelter in high and exposed situations." The first enclosures were planted in accordance with this plan, only afterwards it was found necessary to set young oaks instead of acorns, few of the latter coming up. Lord Glenbervie also commenced careful experiments, which have since been continued, for testing the transplanting of young trees of various ages; the table gives the result

GIRTH TAKEN AT SIX FEET FROM THE GROUND.

	Transplanted at 16 Years of Age.	Transplanted at 23 Years of Age.	Not transplanted at all.
September 14th, 1809	7 $\frac{1}{2}$ inches	7 inches	11 $\frac{1}{2}$ inches
October 5th, 1814	14 $\frac{1}{2}$ "	11 "	16 $\frac{1}{2}$ "
October 20th, 1820	23 $\frac{1}{2}$ "	19 "	19 $\frac{1}{2}$ "
" 1826	32 $\frac{1}{2}$ "	27 $\frac{1}{2}$ "	23 "
" 1830	40 $\frac{1}{2}$ "	35 $\frac{1}{2}$ "	26 $\frac{1}{2}$ "
" 1836	48 $\frac{1}{2}$ "	39 $\frac{1}{2}$ "	30 "
" 1840	53 $\frac{1}{2}$ "	42 $\frac{1}{2}$ "	32 $\frac{1}{2}$ "
" 1846	60 $\frac{1}{2}$ "	47 $\frac{1}{2}$ "	36 $\frac{1}{2}$ "
" 1850	64 "	50 $\frac{1}{2}$ "	39 "
" 1854	66 $\frac{1}{2}$ "	53 "	41 $\frac{1}{2}$ "
" 1858	69 $\frac{1}{2}$ "	55 $\frac{1}{2}$ "	44 $\frac{1}{2}$ "
" 1862	72 "	58 "	46 "
" 1866	76 $\frac{1}{2}$ "	61 $\frac{1}{2}$ "	47 "
" 1870	78 $\frac{1}{2}$ "	64 $\frac{1}{2}$ "	48 $\frac{1}{2}$ "
" 1874	81 $\frac{1}{2}$ "	66 $\frac{1}{2}$ "	49 $\frac{1}{2}$ "
" 1878	84 $\frac{1}{2}$ "	69 $\frac{1}{2}$ "	51 $\frac{1}{2}$ "
" 1880	85 $\frac{1}{2}$ "	70 $\frac{1}{2}$ "	52 "

of these experiments from 1809 to 1880 inclusive, the last measurement, which tends to show that trees which have been transplanted make much more rapid growth than those which remain where they have grown from the acorn.

On 15th September, 1809, 2,000 acres in various parts of the forest were selected for planting, and 240 acres of Whitemead Park were actually planted this season.

In 1810 the following plantations were ordered :—

				A.	R.	P.
Barn Hill, containing	...	...	...	353	2	3
Serridge	"	...	...	387	3	24
Beechen Hurst	"	...	...	308	2	36
Haywood	"	...	...	407	1	34
Holly Hill	"	...	...	41	0	38
				1,498	3	15

These were planted by Mr. Driver, upon his own plan, "which was to dig holes 4 ft. apart every way, or 2,722 to the acre, and to plant an acorn in every hole but the tenth, in it substituting an oak tree of five years old. The holes for the acorns were dug 15 in. square and 9 in. deep; those for the young trees were made 18 in. square and 12 in. deep. The acorns cost 8s. per 1,000, and the trees 70s. per 1,000. One tree out of every hundred was a five years' old Spanish chestnut, so that planting the enclosures this way cost about £3 15s. per acre, and the seedlings about £4 5s. The fences were to consist of a bank 5 ft. high, with a row of French furze at the top and bottom, or, where impracticable, a dry wall instead."

In 1811 only one plantation, viz., Crab Tree Hill of 372 a. 2 r. 34 p., was formed, and planted like the last.

In 1812 the following were made :—

				A.	R.	P.
Shute Castle	...	...	...	158	3	35
Bromley	...	...	...	258	3	13
Chesnuts	...	...	...	163	2	13
Sallow Vallets	...	...	...	397	2	33
Ruerdean Hill	...	...	...	313	3	19
Addition to Buckholt	...	...	...	14	3	29
				1,307	3	22

"These were planted on a different plan from the former ones, since from the exuberance of weeds and the ravages of mice, that method had failed, three-fourths of the acorns never appearing, and those that did come up were too weak to make their way through the more luxuriant growth that overwhelmed and choked them."

A report, signed by Lord Glenbervie, dated 4th June, 1812, sets forth that the navy required annually 88,659 loads of oak of a century old; and that in the then state of the Royal forests they could only supply one-tenth of that amount, and would always be deficient unless 1,000 acres were planted every year for the next 160 years, by which time the above quantity might be annually felled. In

this year the task of setting out the remainder of the 11,000 acres to be enclosed was completed.

In 1813 the plantations made were :—

				A.	R.	P.
Oaken Hill	...	...	...	477	2	11
Park Hill	...	...	...	141	0	26
Blakeney Hill	...	...	...	816	1	0
				1,434	3	37

In 1814 the three following enclosures were made :—

				A.	R.	P.
Staple Edge	..	...	...	943	2	17
Nag's Head Hill	...	...	...	809	2	4
Russell's	...	...	...	990	0	16

The last of them, being the largest in the forest, was not regularly planted, but left for the most part to natural growth.

It was during this year especially, but to a certain degree also in the preceding and succeeding ones, that this forest and the New Forest were visited with an enormous number of mice. They appeared in all parts, but particularly in Haywood Enclosure, destroying a very large proportion of the young trees, so much so that only four or five plants to an acre were found uninjured by them. The roots of five year old oaks and chestnuts were generally eaten through just below the surface of the ground, or wherever their runs proceeded. Sometimes they were found to have barked the young hollies round the bottom, or were seen feeding on the bark of the upper branches. These mice were of two kinds, the common long-tailed field mouse and the short-tailed. There were about fifty of these latter sort to one of the former. The long-tailed mice had all white breasts, and the tail was about of the same length as the body. These were chiefly caught on the wet greens in the forest; the short-tailed were caught both on the wet and the dry grounds. Cats, traps, and poisons were unable to cope with the invaders. At last a miner named Simmons suggested that little pits should be dug all over the enclosures, about 2 ft. deep, 2 ft. across, and wider at the bottom than at the top, at a distance of 20 yards apart; into these the mice fell, and were drowned or unable to get out. Simmons and others were employed, and paid by the number of tails they brought in, which amounted in the whole to over 100,000. In addition to this polecats kites, hawks, and owls visited the holes regularly, and preyed upon the mice caught in them. A small owl (*Strix passerina*) was particularly active in their destruction; moreover, the prisoners in the holes ate each other.

A. R. P.

In the year 1815 the following plantations were added :—

Leonard's Hill ...	...	...	...	66	0	32
Edge Hills ...	...	...	...	494	1	36
Cock Shot ...	...	...	...	598	0	22
Yew-tree Brake ...	...	...	...	183	0	0

1,341 3 10

In 1816, the last of the enclosures made under the Act of 1803 were completed :—

				A. R. P.
Perch ...	...	...	...	386 1 15
Aston Bridge ...	...	...	...	475 0 4
Kensley Ridge ...	...	...	...	376 1 27

The cost of these operations since 1808 had amounted to £59,172 5s. 10d.

In 1817 Viscount Gage's property, the High Meadow Estate, of 4,257 acres 15 poles, was purchased by the Crown for the sum of £155,863 3s. 2d. This estate had, *temp.* Edward I. (1282), formed one of the ten bailiwicks into which the forest was divided, when it was held by John Walden, called (from the parish in which the estate was mostly situated) John de Staunton, by service "of carrying the king's bow before him when he came to hunt in the bailiwick, and by homageward and marchat," and "he had for his custody housbote, heybote of every kind of tree given or delivered by the king, all broken oaks, and all trees of every sort thrown down by the wind."

The following quotation, from the private papers of Mr. Machen, dated 1818, speaking of the plantations we have mentioned, may be of interest :—"From the Acorn Patch a large quantity of young oaks have been transplanted into the open parts of the forest; the trees drawn out are thriving, and many of them grow faster than the trees remaining in the Acorn Patch. The trees, though never transplanted before, came up with bunches of fibrous roots; and though of a large size, being from 10 to 25 ft. high, scarcely any of them failed. Several experiments were tried as to pruning closely, pruning a little, and not at all; and it appears that those pruned sufficiently to prevent the wind loosening the roots answer best, although many of those which were reduced to bare poles, and had their heads cut off, are now sending up vigorous leading shoots, and have every appearance of becoming fine timber. Those unpruned did not succeed at all."

Alluding to the earthen banks he says: "In most parts they appear to succeed very well, and the furze on the top of them grows very luxuriantly; but in some places, and those where the bank of mould has accumulated by being washed there in floods, the banks are

mouldering; and in the last two years hawthorn quick has been planted in those parts, and now looks very flourishing. The nurseries at this time contained about 4,000,000 of young oaks, and 600,000 firs, besides trees of other sorts."

Mr. Machen continues:—"There are scarcely any natural trees in the forest but oak and beech. Birch springs up spontaneously in every enclosure, and overruns the whole forest; the few ash trees look scrubbed and unthrifty."

In 1819 there was a severe frost on 29th May, "which was so severe that the verdure throughout all the low parts of the forest was entirely destroyed. There was not a green leaf left on any oak or beech, and all the shoots of the year were altogether withered." In this year the estate of Ellwood, purchased from Colonel Probyn, consisting of 110 acres, was planted; the holes were dug 4 ft. apart in rows, and 5 ft. between the rows; the trees planted were 30,000 Scotch firs, 1,600 pinasters, 3,600 larch, 6,000 Spanish chestnuts, 120,000 oaks of three and four years old, and 4,500 seedling oaks.

In the autumn of 1820 and spring of 1821 nearly 2,000,000 of trees raised in the forest nurseries, viz., 1,625,500 oaks and 360,500 firs, were planted out to mend over the fourteen enclosures.

In 1824 the Great Doward Estate was purchased for £15,000; "although separated by the river Wye, and never before included within the limits of the forest, it certainly groups with the High Meadow Woods, and moreover forms a definite part of the geological basin of the district."

Our limits do not permit us to touch upon geology; the forest covers and is almost conterminous with a typical coal basin. The coal measures, containing 31 coal seams, are 2,400 ft. thick, encircled by millstone grit 455 ft. thick, carboniferous or mountain limestone. 480 ft. thick, and lower limestone shale 165 ft. thick, the whole surrounded by the conglomerate of the old red sandstone.

There is a mem. in Mr. Machen's note-book, dated 28th May, 1831, in which he says, "The most extraordinary blight is now upon the trees that I believe ever was known; it is confined entirely to the oak, and chiefly to the large trees, although in some parts it is extending to the young plantations. The whole of the High Meadow woods, and great part of the forest, particularly Russell's enclosure, and where the timber is thick, are entirely stripped of their leaves, and look as if fire had passed through them. Where a beech stands amongst them it is perfectly green. The grubs and their webs are so thick that it is disagreeable to ride amongst the trees, and like going into a net." From certain other details, we believe "the grubs" to have been the caterpillars of the "leaf-roller moth." (*Tortrix viridana*).

In the year 1831 the discontent of the foresters, who complained that they were deprived of their rights by the enclosures (which now contained 16,500 acres), came to a head, and on the 7th June a riot commenced; some 200 men, armed with axes, and accompanied by swarms of lads and boys, set to work, and on that and the four following days "destroyed nearly one-third of the fences in the forest, the reparation of which cost about £1,500." Troops had to be sent to stop the riot. This and other disturbances led to the appointment of a special commission in 1833 to inquire into and report upon the forest and all appertaining thereto. They found that the forest now contained 1,462 houses, and that since 1812 encroachments had increased from 24 acres to 1,462 acres. In 1712, as we have noticed, there were no houses but those of the keepers; the foresters were, naturally enough, anxious to become landed proprietors and to live in their own houses, and were content to inhabit "cabins" of their own construction. "The turf-covered cabin, resting on four dry walls, without windows, and pierced only by a low door, with a very rude fireplace and chimney in 'the pine end,' and partially paved with rough stones, is now being rapidly superseded by two-floored cottages. In bygone days, a few neighbours, taking advantage of a moonlight night, accomplished the erection of a cabin ere the morning dawned, in which case it was supposed that the keepers had no power to pull it down."

In the time of the Commonwealth the proceedings of the Government appear to have been summary; "400 cabins of beggarly people living upon the waste, and destroying wood and timber, were thrown down." The Dean Forest Commissioners, appointed in 1838 by Act of Parliament, proceeding in a more constitutional manner, causing the whole district to be carefully surveyed and mapped, and carefully inquiring into all claims, gave their awards, and adjusted the encroachments. In 1841 an Act was passed, based upon the reports and recommendations of the Commissioners, and settling mining and other matters, and practically putting the forest and all appertaining to it upon its present footing.

In the year 1848 the MS. of Mr. Machen (deputy surveyor) informs us that there was another serious visitation of caterpillars. "The oak trees have been attacked for several years past by a small caterpillar, which eats all the leaves, and this year the destruction has been greater than ever; the whole forest has been almost leafless: the high ground and the low, the large timber and the young plantations, have all suffered alike. I first noticed this blight in the High Meadow Woods in 1830, when they and several parts of the forest suffered, but it was principally confined to the large timber. It has continued more or less every year since, but this has been the worst year of any; yet it is remarkable that the High Meadow Woods

are free from it and in fine foliage, but no other part of the forest has escaped." "There seems to be no method of checking their ravages. *The rooks come in great numbers, and they and other birds destroy great quantities.*" We italicize these words in the hope that they may help to draw attention to the services of our wild birds, which, notwithstanding a Preservation Act, seem to be threatened with extinction. Let us say a word or two also for the hawks and weasels, against whom our gamekeepers, or rather their employers, wage a never-ceasing war of extermination. We have mentioned the services of these "vermin" in thinning down the mice when they invaded the young plantations; we would remind our readers of how the vines have for years past suffered in the south of France in consequence of the almost complete annihilation of small birds. We cannot upset the balance of animal or of any other life in nature without paying for it dearly. and we have read with much satisfaction an able leader on this subject in the *Daily Telegraph* of December 1st, 1881.

In 1854, 4,982 acres of plantation were thrown open.

In 1855 an attempt was made to introduce the deodara; some thousands of them were planted out, but the cutting winds and the smoke of the furnaces of the many ironworks, &c., were too much for them, and they failed.

In and since 1855, 6,033a. 2r. 11p. have been thrown open to the commoners, the trees being considered safe from injury by cattle.

No timber has been taken for the navy for many years now, iron having superseded it to a great extent, and the acid in oak timber is injurious to iron, if used as a lining.

The Severn and Wye tramway has been converted into a railway, mineral and passenger, joining the Severn Bridge and Great Western lines at the south end, and the Ross and Monmouth at the north end; the Coleford branch is also completed, and a continuation from thence to Monmouth is also in progress. Another is projected from the lower, or southern, end of the forest to Monmouth, Abergavenny, &c., and a mineral line is constructed from Cinderford to the Gloucester and Hereford Railway at Micheldean Road, but not yet opened. All of these are, or will be, valuable to the forest as means of transit for timber and minerals.

The following new enclosures have been made for the growth of timber since 1855, viz., in

		A.	R.	P.
1857 Church Hill, containing	...	243	0	7
1858 Cinderford	...	5	1	29
„ Delves, No. 5	...	33	8	8
Carried forward	...	282	1	4

		A.	R.	P.
Brought forward	...	282	1	4
1859 Clements' Tump, containing	...	16	1	0
1860 Moseley Green	" ...	43	2	1
1860-62 Ruerdean Hill	" ...	50	0	17
1860-61 Lea Bailey	" ...	135	3	8
1861 Brains Green	" ...	7	2	12
1862 Barnhill	" ...	19	0	3
" Bourts	" ...	22	0	9
1863-71 Hazel Hill	" ...	12	0	8
1863 PlumPhill	" ...	16	3	38
" Coverham	" ...	22	2	16
1869 Little Kensley	" ...	137	2	19
1870 Bream Tufts	" ...	30	0	26
1871-72 Blaize Bailey	" ...	91	3	18
1872 Bradley Hill	" ...	58	1	38
Total	...	946	1	17

Blight has been more or less general every year, but this present year (1881) has been almost the worst ever known in Dean Forest; it has not been quite so bad in the High Meadow Woods, but in the Forest proper the caterpillar shave made terrible havoc. A resident observer writes as follows:—"It was strikingly evident last summer that the *Quercus robur* (*pedunculata*), or old English oak, was attacked by blight more severely than the *Quercus sessiliflora* (or surmast oak). Single trees and groups of several together would be seen in full foliage or but slightly injured, and when examined these were found to be of the last-mentioned variety; and all around them the *Quercus robur* would be leafless and bare, having the appearance of trees in the middle of winter. Whether the almost complete immunity of this variety from the devastating attacks of these caterpillars may be attributed to the coming into leaf earlier, and consequently being fully developed when the other variety is just unfolding the leaf, being the period when the blight makes its first appearance, or from some acid or bitter property in the leaf, may be a subject for future investigation. The very rapid and destructive nature of the blight this season (1881) may have been caused by the absence of the large flocks of rooks, jackdaws, starlings, and other small birds, which have in previous years attacked the blight on its first appearance; and, as each bird will consume a large number of grubs daily, the plague was formerly much checked at the outset. The severe weather of last winter undoubtedly killed large numbers of these birds, and the caterpillar was consequently almost unmolested."

William the Norman hunted the deer in these woodlands, as we have seen, in 1069. In the reign of Henry I. they were so numerous that tithes of them were sent as a Royal present to the Abbey of Gloucester. In 1790 there were about 800, and in 1849 about 450, soon after which they were ordered to be abolished, on account of the poaching frays that occurred, and the troubles arising out of them.

The foregoing pages, in which we have traced the progress of the Forest of Dean from the Norman Conquest up to its settlement under the Act of 1841, will have shown that it has only of late been brought under regular treatment as a vast plantation of timber. Roundly it comprises at the present time 22,000 acres, of which 15,000 acres are under timber cultivation, and the average revenue yielded to the Crown, clear of all expenses, for the last ten years (up to 1880) has been £6,200 per annum. From what we have written of its history it will have been foreseen that it contains no quantity of fine timber. Fine plantations are coming well on, and a generation or so hence will yield a rich return for the foresight that created them, and the painstaking and persistent energy that has persevered upon the lines

laid down. There are a few ancient trees of no very remarkable size scattered here and there, of which "Jack of the Yat" by the roadside, near the 16th milestone on the Long Hill, is probably the oldest *within the present bounds*. The keeper's lodge hard by is 603 ft. above the sea. In 1830 it was re-



JACK OF THE YAT.

corded by Mr. Machen as measuring 17 ft. 8½ in. at six feet from the ground, and in 1846, 18 ft. 3½ in. We measured it most carefully in May of last year (1881), and could only make it 18 ft. ¼ in. It is of no great height, and the main trunk, having been struck by lightning some years ago, is very much decayed. What at first appears to be a second tree grows close by; we believe it to be a sucker from the parent "Jack." It is said to be about 600 years old, and is so unimposing in appearance that it would hardly attract the attention of any passer by not actually in search of it; it is of the variety *Quercus robur*.

The "Crad Oak," a fine specimen of *Quercus sessiliflora*, in flourishing condition, stands back in the woods behind "Jack." The best way to hit it off is to go to the corner of the lodge farthest from the turnpike road, and a few yards from thence it will be seen on the right of the cart track.

Outside the present but within the ancient forest bounds is the very much larger and decidedly older "Newland Oak," measuring 41 ft. round the trunk, and being probably one of the oldest and largest oaks in the kingdom.

The finest beech in the forest grows near York Lodge, near the entrance to Whitemead Park, measuring 18 ft. in circumference. "The Danby Beeches," near the lodge of that name, are very fine and strikingly handsome trees on the crest and slope of a steep hill which shows them off to advantage; a pleasanter place for a picnic can hardly be than the green paddock of the lodge, with its well of ice-cold water from the living rock, and a superb view over Severn-dale from the Malverns to the Cotswolds.



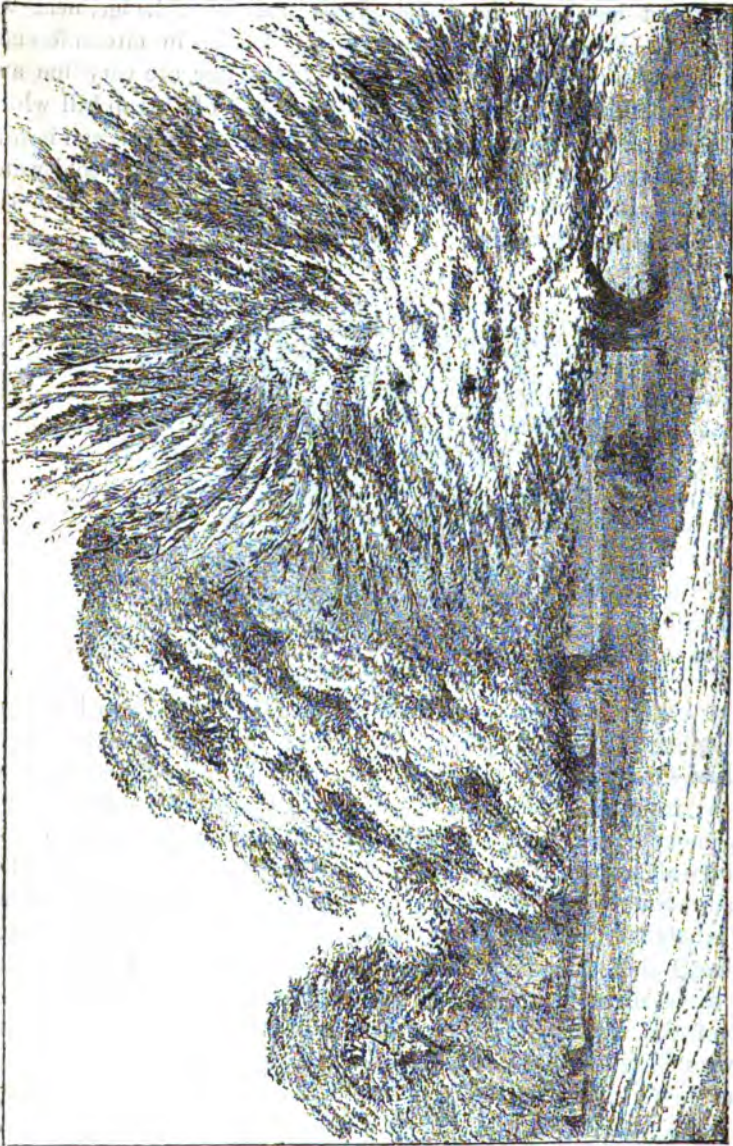
THE NEWLAND OAK.—*From a Photograph by W. Harding Warner.*

Five other very handsome trees, known as the "High Beeches," forming one of the attractions of the forest, grow on a piece of open parklike ground by the wayside near Coleford Meend, 745 ft. above the sea; from their commanding situation and great height they are conspicuous objects, and to wandering travellers valuable landmarks for miles all round. The tallest is one of the "station-marks" of the Ordnance Survey; it measures 18 ft. 6 in. at six feet from the ground, and its height is 108 ft. There are at least three places called "High Beeches," and strangers will do well to specify which of these they wish to be directed to. There are two "Dry-Brooks," one at either skirt of the district, and "devils' chapels," "devils' ditches," and "scowles" (old surface iron mines), without end.

The sketch on the next page of the High Beeches was taken in May, 1881, before the leaves were fully out; one of the five, the tree nearest on the right, was much more backward than the rest, the buds being not more than half-opened.

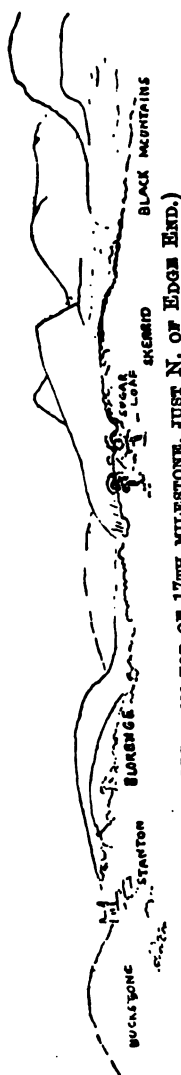
A few hundred yards farther north along the turnpike, and just beyond Edge End, stands the 17th milestone from Gloucester. From

this spot there is a magnificent view across the counties of Monmouth and Hereford into Wales, with the Black Mountain, and the Skerrid shutting in the horizon, and the towering cone of "The Sugar



THE HIGH BEECHES NEAR COLEFORD MEEND.

Loaf," at Abergavenny, lifting its head above them all: the accompanying outline sketch may help strangers to identify distant points.



There are some noble beeches and oaks in the King's Walk in front of the Speech-house; the view from the Speech-house itself extending for miles and miles northwards up the gorges of the Cannop, and of the Lyd Brook, far away out of Gloucester into Herefordshire, over rolling hills clothed in sylvan glories radiant with the sunlight, the air fresh, bracing, and perfumed with the fragrance of the opening beech-buds, the woods ringing with the song of the blackbird and thrush, the springy turf carpeted with the wood anemone, violet and primrose; the unfolding fronds of many ferns, the bluebells, the meadow-saffron and the orchis all bursting forth, in the vigour of the glowing springtide is a delight and a refreshment never to be forgotten.



SCOWLES near Clearwell Meend.

On either hand and round about the Speech-house lies the Holly Wood, perhaps without its equal. The hollies are said to have been planted in the time of Charles II. With not very many exceptions, they seem to be all of about the same age. The general girth of the trunks runs from 3 ft. to 3 ft. 6 in. A large number of them are unsound and decaying rapidly. About 150 yards from the N.W. angle of the Speech-house there is a venerable holly, measuring 7 ft. 11 in. round the main trunk: three branches of it measure respectively 4 ft. 7 in., 4 ft. 5 in., 3 ft. 11 in. On the other side of the road, about 100 yards from the front of the house, on a line midway between the front door and the gate, there is another the crown of which (it is almost too short to be called "trunk") measures 9 ft. 6 in.: from this crown three main shafts proceeded, one of which has been lately blown down; the first measures 5 ft. 2 in. the second 4 ft. 11 in., and the stump of the missing one 4 ft. 3 in. These happen to lie close at the door; but there are still finer specimens to be found farther afield. In a space of 120 yards by 100 yards, we counted exactly 124 holly trees planted apparently without definite order; in some cases at long intervals

in others clustered together in groups of three or five, sometimes so closely that the roots and bases of the trunks have so grown together that it is not easy to decide whether they are really separate trees, or shafts springing from one stunted crown. Perhaps the decay of many of these trees may be due to their being overgrown, and dripped upon by the branches of the far taller timber trees, amongst and beneath which they grow. This Holly Wood extends for some 2,000 yards on both sides of the road, from the Great Western Colliery nearly to Foxes Bridge. Its depth on either side is very variable, and the planting of the trees irregular; but we may roughly estimate that it contains some 5,000 holly trees, probably many more.



VIEW FROM BELOW THE YAT ON THE COLDWELL SIDE, LOOKING ACROSS THE HUNTSHAM PLAIN WITH GOOD-RICH SPIRE IN THE DISTANCE.

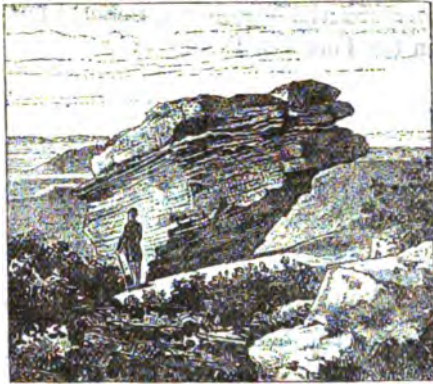
One day when visiting the iron mines round about Coleford* and Perry Grove, Mr. George Atkinson, one of the most experienced of gentleman foresters and miners, son of the late Deputy-Gaveller of the forest, informed us that the outcrop of *the mine* (a local term signifying the whole series and range of iron-bearing beds throughout the basin) could be traced by the lines of self-sown yew trees, which have sprung up everywhere along its course, and mark all the windings and indentations in a most remarkable manner. From the spot on which we were standing (the high ground at Gattle's Cross, on Clearwell Meend) this fact was easily demonstrated, the eye being able to follow the margin of the outcrop for miles. We

subsequently tested this observation in other parts of the district, and found it fully borne out. Perhaps the yew trees thrive best upon a limestone soil, or it may be that the iron ore supplying them with the deep red colouring matter of their wood and bark, and with the dark green of their leaves, or the two causes combined, may lead to "natural selection;" but assuredly they form a very marked feature of the mountain (*alias* carboniferous) limestone encasing the "measures" in the Forest of Dean.

"Symonds Yat" and the "Coldwell Rocks," a grand range of wooded cliffs of the mountain limestone, at the foot of which the wandering Wye winds its way to Huntsham Plain, are beautiful

* Coleford is the post town and chief market of the Forest of Dean.

beyond description; the woods and walks along the crest of the rocks are part of the estate of Bicknor Court, the residence of Sir John Maclean, F.S.A., by whose courtesy and kindness visitors are



THE BUCKSTONE.

permitted to enjoy a stroll through one of the loveliest sylvan scenes in England. But we must not be tempted into descriptive writing about views and landscapes, or we shall never end; we may only venture to notice one other striking object, and then we have done.

The Buckstone, near the village of Staunton, is 891 ft. above the sea, and is outside the present forestal bounds, though inside the old ones; the highest point within the reduced limits is Ruardean Hill, 857 ft. It is one of the most perfect of the old Druidical rocking-stones, and is balanced on an almost precipitous steep of the Buckstone Hill above the Monmouth road. It is a block of old red conglomerate, 57 ft. in circumference on the top. Its foot, some 24 in. only in diameter, rests upon a flat slab of about 14 ft. square. It is easily rocked by one man. Its foot, or neck, is crumbling away rapidly, and we only hope that it may not be displaced by the folly of some excursion mob.

Our space is at an end. We have endeavoured to trace the progress of this too little known district from the earliest historical times, when the Roman legionaries made its paved highways through swamps and bogs and over sandstone hills, or worked the iron mines in the "scowles" on the surface of the outcrop, through the times of our Norman kings, who were mighty hunters, and held high revel in this "royal chase," down to its final settlement under the Commissioners of Her Majesty's Woods and Forests during the present generation, from such records and publications as are available: for

further particulars, notices of its antiquities, descriptions of the walks and drives, and hints about excursions that may be made in it, we refer our readers to a little book from the pen of the writer of this paper, published by Mr. Bellows, of Gloucester—and noticed at page 444 of this *Journal* in the October number, 1881—entitled “A Week’s Holiday in the Forest of Dean.”

J. Y. H.

THE BEAUTIES OF BRITISH TREES.

(Continued from page 702.)

THE APPLE (*Pyrus malus*) is a characteristic tree of north temperate Europe. The genus of rosaceous plants to which it belongs, is confined to north temperate and cold regions, where they occur in the deciduous woodlands and hedgerows, brightening the spring landscape with their white or pink blossoms. The apple cannot be cultivated within the tropics or north of the Arctic circle; our cultivated varieties are supposed by Mr. Darwin—a high authority on such matters—to be derived from the wild crab of the Caucasus; and this species has appropriated as its popular name what was once a common Germanic term for fruit of any kind. The crab seldom occurs of a large size in a wild state in England, and is often exposed to the indignity of being cut down with the hedgerow. The short stems, not so firmly rooted in the ground but that they may easily be blown to one side by a gale, are familiar to us, as they slope in every direction, in our orchards. Where the soil is poor or badly drained, or the trees are crowded, the bark is often lichen-covered, and the gnarled and knotted branches are the chief habitat, or “host,” as the botanists facetiously term it, of that unwelcome guest, the mistletoe. This parasite, which preys on the life-fluids of the tree, and is able to maintain its own verdure all the year round, is not unfrequently absolutely fatal to young apple-trees in our western orchard counties.

There are generally three principal branches given off at an angle of from 90 to 120 degrees, so as to produce a habit more spreading than that of its congener, the pear. The leaves have made their appearance before the flowering, which usually commences about the middle of May, but are not so fully grown or so green as those of the pear at a similar stage. They have then a brownish tinge, and though individually pretty, are not effective among the flowers, whilst they subsequently become a dull darkish green, which has not much beauty.

They are oblong and rounded, with an abrupt point—"acuminate," as it is technically termed—not egg-shaped and tapering gradually "acute," as are those of the pear. Far beyond the pale white beauty of the pear-blossom, however, which seems cold in the yet early spring, is that of the delicately blushing, rosy, and white-streaked, round buds of the apple. Even in May, that time of flowers, when—

"The meadow by the river seems a sea
Of liquid silver, with the cuckoo-flowers,"

that season of marsh-marigolds and cowslips, of wild hyacinths and purple orchids, of the horse-chestnut, the lilac, and the guelder rose, of pæonies and tulips, there is no more beautiful sight than the far-stretching orchards of Somerset, Hereford, or Worcester. In the exquisite folding of the petals in each short-stalked flower over its golden heart of stamens we have a bloom far more becoming to an English bride than the exotic orange-flower with its ivory pallor. When we look for the deeper meaning of, and reason for, all this lavished beauty, we must confess ourselves as yet much at a loss. The succession of variously-hued flowers as spring advances into summer and summer into autumn, so that blue flowers as a rule precede white ones, whilst these in their turn precede the purple, yellow, and red blossoms of the summer, would seem to be due in some imperfectly explained manner to the increasing intensity of the sun's light as it travels northward from the winter to the summer solstice. Dr. Hermann Müller finds that the stigmas in the apple blossom are as a rule mature for fertilization before the pollen is ripe, a condition known technically as "proterogynous," so that self-fertilization cannot as a rule take place in this species; and that the flowers by their beauty and their abundant honey attract nine kinds of bees besides some other insects. We have yet much to learn from labours like those of Sir John Lubbock as to the individual tastes in colour of the various insects, and as to whether we can connect, by the theory of sexual selection, their own colouring with that of the flowers they frequent. With regard to the plant, Mr. Darwin has apparently shown the advantage to the species of an occasional cross.

The wealth of beauty of the apple in flower, whether massed together in our orchards, or happened upon as a pleasing surprise in a hedgerow, or "deep in the thicket of some wood," is succeeded by another charm, perhaps not equal but at least not despicable, that of the tree in fruit. In the wild state crab-apples are mostly of a deep red tint, as that accurate observer the poet Clare describes them:—

"Crabs sun-reddened with a tempting cheek."

There would seem, however, to be more than one variety in England

in this point, as I have found crabs occasionally of a pure golden yellow, reminding us of Phillips' "Pippin burnish'd o'er with gold." Whatever its form in other respects, the apple is easily distinguishable from the pear by its "umbilicus," or depression at the base to receive the stalk. Its rounded outline, with one cheek perchance "sun-reddened" while the rest remains green or yellow, has often caused it to suggest the plump and rosy cheeks of an English maiden. When we ask the *raison d'être* of this rosy-cheeked, succulent, and juicy fruit, we are again met by some of the most interesting problems of modern botany. First, the act of fertilization or impregnation seems to have an effect comparable to that of the virus of a gall-fly in determining the flow of nutriment in the direction of the fertilized seeds and their enclosing ovary. The petals and stamens wither and fall, and in nearly every fruit enlargement of the ovary and often of some adjacent structures takes place. A succulent fruit is thus produced, often having some gay autumn tint, red, gold, or purple, attractive to the bird-world by its colour, and when ripe luscious to the taste. Even the chemical processes by which unripe fruits are acid, and only become sweet and mellow as the enclosed seeds mature, would seem to act as a provision of Nature to prevent the swallowing of the seeds by birds when unripe. Many country-schoolboys will remember the sharp verjuice of the unripe crab used as a most efficient substitute for dentifrice. In the apple, as in the rose, the ovaries are at first not united. In the former they are five in number, and are completely over-grown and united by the development of the so-called "calyx-tube," an outgrowth from the flower-stalk, which shuts in the parchment-like core and carries up with it the withered calyx-leaves to form a crown on the summit of the fruit. The ripe apple falling to the ground, reminding us in its fall of somewhat apocryphal tales of Newton and the discovery of gravitation, must often have become the prey of animals higher in the scale of creation than the birds, the wild boars, cattle, deer and horses of the primeval European forests. Otherwise, its firm skin may for some time keep the decaying pulp together, so that it may to some extent aid the seed in germination. The tough, dark-brown skin (*testa*) of the seed offers considerable resistance either to damp or to the digestive process, so that in any case it has due chance of sprouting; not too soon, and perhaps at some distance from the over-shadowing of its parent tree, but with a good opportunity for further life—for success in the struggle for existence. If we have wet weather during the forty days at the end of July and in August traditionally connected with Swithin, sainted Bishop of Winchester, whose feast is July 15th, the apples will have the means of becoming large and juicy before they

ripen. Lest, however, it be erroneously supposed that, dissecting-knife in hand, our sense of beauty has been swamped by the study of its rationale, we must hasten to speak of the use of the apple tree to the landscape gardener or estate-manager planting for effect. True, the unripe fruits of the wild apple are used in France in the manufacture of verjuice; true also in olden time our ancestors found in them ripe a winter charm,

“When roasted crabs hiss in the bowl”

of warm ale; but the apple has less utilitarian, more æsthetic applications. The trim regularity and level-topped monotony of the orchard may suggest the kitchen too strongly to form part of the chief prospect from the windows of a country house, according to our modern ideas. I know, however, several old manor-houses and comfortable farmsteads, where a generation ago there was no lawn, as at present, or at most a green alley for bowls, shut in by a yew-hedge, whilst the apple-orchard, in whose long grass grew winter aconite, snowdrops and daffodils, was planted close to the parlour windows. One or two separate trees, either of wild crab or of some grafted sort, may well stand on the edge of the shubbery or near the water-side. The apple loves a rich alluvial soil where the drainage is good, especially a sandy loam rich in iron and manganese. Its rosy petals will light up the green-budding background, or pleasingly litter the surface of the water, though its early-falling withered leaves are troublesome when on the lawn. Even when condemned for age or as out of place, the apple-tree lends itself to beauty. I well remember in my childhood's home that nothing made a better support for a “tub” in the garden than the three-forked apple stem. Half a small barrel, on this support, well covered with oak bark (virgin cork was not then in the market), and draped with canary-creeper or nasturtiums, blue lobelia, and ivy-leaved and scarlet geranium, formed one of the brightest “bits of colour” in that modest home of Flora.

THE ASH (*Fraxinus excelsior*), called by Gilpin “the Venus of the woods,” and said by the poet Spenser to be “for nothing ill,” is one of the more important of our forest trees. We are not much concerned in our present purpose with the eight variations which a French botanist, M. Gandoger, has ranked as species. The ash is truly native in Great Britain, as in most parts of Europe. It is mentioned in early English books, and plays a prominent part in Scandinavian mythology. “The primary characteristic of this old Northland Mythology,” says Carlyle, “I find to be Impersonation of the visible workings of Nature. Earnest, simple

recognition of the workings of Physical Nature, as a thing wholly miraculous, stupendous and divine. What we now lecture of as Science, they wondered at, and fell down in awe before, as Religion All Life is figured by them as a tree. Igdrasil, the ash tree of existence has its roots deep down in the kingdoms of Hela or Death; its trunk reaches up heaven high, spreads its boughs over the whole universe: it is the Tree of Existence. At the foot of it in the Death kingdom, sit three Nornas, Fates—the Past, Present, Future; watering its roots from the Sacred Well. Its boughs, with their buddings and disleafings,—events, things suffered, things done, catastrophes,—stretch through all lands and times. Is not every leaf of it a biography, every fibre there an act or word?"

The green hoariness of the smooth bark of this beautiful tree, as it sends up a main stem sometimes 70 or 80 ft. in height, or hangs pendulous boughs by the water side, renders it attractive even in its leafless condition. It more commonly attains a height of from 30 to 50 ft., the girth being from 5 to 6 ft.; but as the old ballad says:—

"The Oak, the Ash, and the Ivy tree,
O, they flourished best at home, in the north countrie."

It is here, as in the dales of Yorkshire, that we see it at its best, growing in rich loam, and in a moist situation. Though useful for crate-making, and to the cooper and turner, for the shaft of the warlike lance, and the spoke of the peaceful wheel of coach or waggon, owing to its great flexibility it is essentially "the husbandman's tree," for every kind of agricultural implement. The wood is a greyish-white throughout, the sap-wood being used along with the more central portions, an advantage peculiar to but few species. The cut stumps, however, or the timber when beginning to decay, becomes stained of a blackish hue at the heart. Not to digress too far, however, into the region of the merely useful, let us next note the strikingly beautiful contrast with the grey bark of the large black buds. These have attracted the attention of the Laureate, as, in "The Gardener's Daughter," he describes Juliet's hair as—

"More black than ash-buds in the front of March."

He also notes how

"The tender ash delays
To clothe herself when all the woods are green."

Often, in fact, this species is not in full leaf until June, though in exceptional seasons, such as 1848 and 1840, as recorded by Mr. Edwin Lees, leaves may appear in the first week of May. Before the gracefully cut foliage has, however, begun to burst from the black bud-scales, rich vinous clusters appear in the axils of the

branches. These are the panicles of simple flowers, consisting mostly of purple-black anthers, but also bearing simple flask-shaped ovaries surmounted by a two-forked stigma. The name "Flowering Ash," applied to the manna-yielding European species, is of course a misnomer; since our species has flowers, though they be not the conspicuous objects popularly dignified by that title. *Fraxinus Ornus*, the so-called flowering ash, has a coloured corolla of four petals, as in the allied genera the lilac and the privet; though the petals in the former case are but very slightly united at the base. In this species there is also a small green calyx, but both these envelopes of the essential organs of the flower are absent in the British tree. The flowers in this case are known technically as "polygamous," i.e., some branches of the inflorescence bear stamens only, others only ovaries, and others again bear both. Like most trees which we call "precocious," from their flowering before the bursting of their leaf-buds, the ash is probably often cross-fertilised by the wind. Its flowers appear in April and May. It is in June and July, however, that the "Venus of the woods" appears draped in her full beauty of gracefulness. The pinnate leaves, consisting of from four to seven pair of gracefully tapered leaflets, arranged at some little distance apart along the mid-rib and at the end of a leaf-stalk some two inches in length, give a light, feathery grace to the whole tree. It may be merely rounded in outline or drawn up to some height, and the green of the foliage is somewhat dull and monotonous when viewed closely; but it is the transparency of the tree, the play of the light through its entire leafage, that give its chief charm to the ash. This struck me particularly last summer when looking at some finely grown specimens near the Mote, at Ightham, in Kent, and also at Theydon Garnon, on the outskirts of Epping Forest. Much of this airy lightness is lost when we choose the pendulous variety, as the foliage then hangs downwards like the green locks of some river Naiad; but, like all weeping trees, this form looks well by the water, as in the grounds of Woburn Abbey. It furnishes a leafy shade for a summer tea-party; and, if not too dense, may have its central stem adorned with a festoon of tropæolum or convolvulus. It should not, however, be allowed, as may the common ash, to stand as an isolated specimen, free from all visible background of trees or shrubs, or it will look too much like an artificial dome or mound of boughs. It looks particularly well when flanking a clump of rhododendrons, a trifle lower than itself. The common ash is, however, a tree for the park or meadow rather than for lawn or shrubbery, if planted for ornament; though it is, of course, also much grown in the coppice for use.

In Christ Church meadows, Oxford, and elsewhere, there occurs a variety bearing simple leaves of a single terminal leaflet, known as *F. heterophylla*, a variety more interesting than beautiful. We are not here concerned with the various rhymes which foretell the weather according as the ash comes into leaf before or after the oak, which rhymes are generally of very diverse tenour in different counties. It is worth while, however, to look closely at the lance-shaped outline and toothed margin of each leaflet of the graceful leaves, which are no less remarkable for their early fall in autumn than for their late arrival in spring. They often turn of a clear lemon-yellow before their fall; but, as each leaf does so separately, the tree is not among our most prominent autumn beauties. Of traditions and superstitious associations with this species there is apparently no end. It was, I believe, through a split ash-stem that parents used formerly to pass their sickly children, as a charm against various disorders; and many a rustic probably to this day believes that some dire calamity will befall the country in a year "when there are no 'locks and keys' on the ash." These "keys" or "locks and keys," which have borne the former name in England for centuries, are the fruits which arise from the previously mentioned flask-shaped ovaries when they ripen. They hang in dense, drooping clusters which from a glossy sap-green become gradually streaked with a blackish hue, which then colours them entirely till the fall of the leaf. As the seed only occupies a cavity one-third the length of the fruit, this winged structure is scientifically known as a "samara." It, no doubt, contributes to the dispersal of the seed away from the parent shade when the wind detaches it from the bare boughs, and it may also aid in burying the seed beneath the ground. In warmer climates than our own the stems of various species of ash, when punctured by a cigala or when the bark is purposely cut, yield in summer a thick sugary juice, known as manna. It consists mainly of a sugar termed mannite, which is nutritious when fresh, but soon decomposes, and is then used medicinally as a purgative. Perhaps the sugar which thus exudes in the warmer latitudes goes in the north to produce that greater luxuriance of growth which gives us the ash tree in its highest beauty.

G. S. BOULGER.

(To be continued).



THE THINNING AND PRUNING OF FOREST TREES.

EACH live tree may be regarded as a colony of living, active germs, at work within a clothing of bark, which varies in thickness according to age and species; and the united efforts of each of these industrious communities is directed towards the extension of its limits. Now, where there are many of such colonies or trees, occupying a limited space of ground, the natural results attending their exertions is to seriously limit the space each can possibly possess; therefore, wherever this happens, thinning or pruning, or both, must have to be resorted to. But before we enter into the discussion of the best way to thin and prune trees, let us endeavour to fully understand our subject from a vegetable physiological point of view; and also, to comprehend as much as possible the real nature of the vital actions of trees, and of the external natural forces by which they are both actuated and regulated, as we believe that, without this knowledge, a person in charge of plantations is much more likely to do them serious injury than the least good.

A tree, it may be an old sturdy oak, that has withstood the stormy blasts and colds of five hundred winters, has again in response to warm, genial weather and bright sunshine, not only clothed itself with its green mantle of leaves, but also decorated that mantle with numberless flowers; and however interesting they may be to the casual observer, they have to the forester a much deeper interest, seeing that it is by their means the tree is enabled to propagate its species, and thus prevent it from becoming extinct. Many species of trees have the male and female parts of their flowers growing in one; but the oak is an exception to this, as they are found in separate flowers. The male can easily be distinguished from the female, by being in the shape of a catkin. If, with the aid of a microscope, a grain of the fine pollen or dust, that falls from the male in thousands, is examined it may be found to be in diameter only about the $\frac{1}{1000}$ part of an inch, which is about the breadth of the edge of a sharp razor, and yet, though so small, it is found when broken to be composed of an outer and an inner coat, and that it contains a semifluid granular protoplasm or mucilage, exhibiting an active tremulous motion, and that these granules may be about the $\frac{1}{10000}$ part of an inch in diameter.

Let us now examine the female flower, and in so doing we may find a grain of pollen stuck on to the stigma, or the top of the female part, by a gummy substance which the stigma cells secreted for that purpose. Here the pollen protrudes a very small tube, about the $\frac{1}{1000}$ of an inch in diameter, through the stigma tissues, much in the same manner as the root of a seed pierces the earth, until it reaches the ovule, which contains a semifluid protoplasmic colourless fluid, into which the fovilla of the pollen is discharged. Here both mix and begin to develop into an acorn, which contains the living though dormant germ of a future oak tree, snugly wrapped up in a covering meant to preserve it until it is committed to the care of mother earth—into soil, let us suppose, suitable for its growth, both as to fertility, moisture, climate, and exposure, say in March. Here we leave the seed for a time, until we examine some of the wonderful indications of life to be found in some plants.

Professor Lindley, F.R.S., &c., in his "Theory and Practice of Horticulture," tells us, p. 9:—

"There grows commonly in ditches and stagnant water, a plant called *Chara*, in the large cells of which a current of green globules steadily rises up one side and falls by another, presenting an appearance calling to mind the motion of an endless chain. If one of these cells is choked by a ligature, then the motion continues exactly as before in each of the two divisions so produced. . . . Those philosophers who refused to admit this to be a vital motion analogous to that of the blood, imagined that they had found an explanation in electrical action. But Dutrochet, who once held this opinion, when he attempted to establish his hypothesis upon experiment, found that the magnetic force, even when prodigious, exercises no influence whatever upon the circulation of fluid within the cells of *Chara*, and he was obliged to admit the presence of a vital force, of the nature of which we are wholly ignorant. . . . It is to be remarked that this kind of movement is wholly independent of the general motion of the sap."

With regard to the common nettle, Dr. Andrew Wilson, F.R.S.E., says ("Science for All," vol. iv., pp. 109, 110 and 111):—

"When placed under a sufficiently high power of the microscope, the nettle hair, which, like the nettle itself, might be regarded as an inert structure exhibiting no sign of life or activity, is seen to be a perfect centre of curious and interesting movements. The contents of the hollow nettle hair—or, more strictly speaking, its lining—are seen to exist in a state of continual motion. There are waves of contraction which roll like the billows of the ocean along the whole length of the hair; and there are minor streams of granules which hurry here and there with varying speed through the substance of its interior. Main currents may be traced around the margin of the structure, and that there are many minor currents hidden from the highest powers of our best microscopes no one may doubt. Thus the nettle hair is a very centre of active movements, and of an incessant circulation of its particles and fluid, such as we could not dream existed within the apparently stable and inert plant-form.

"The cells of the Virginian spider lily (*Tradescantia*) exhibit the same phenomenon; but in the latter the currents traverse the cell in thread-like tracts across its substance. The currents here are, moreover, irregular in their movements; occasionally they may be seen to be arrested for a moment, then they again commence their motion, striking out into new ways and paths through the substance matter in the interior of the cell. That common water-weed, *Anacharis*, which, imported from America comparatively few years ago, has overrun our ponds and canals, also exhibits in its leaf cells similar movements; whilst in that curious water plant, the *Vallisneria*, of Southern Europe, the currents are seen to sweep round and round within each cell, setting free the green chlorophyll grains in its sweep, and impressing the observer with an idea of ceaseless and powerful activity.

"The explanation of these curious movements in the cells of plants—revealing to us a literal world of activity concealed beneath the apparently stable front of plant life—is to be found in the fact that the contents of these cells include a layer of that universal 'basis of life' known to every one under the name of protoplasm. It is no theory, but the most stable and most fundamental fact of life-science, that life is nowhere known to exist save in connection with this jelly-like matter. Whatever be the exact relation between protoplasm and life—one of the 'vexed questions' of biology—this much is certain, that only through protoplasm of one kind or another is life exhibited. Thus, in the cell of the nettle hair, or in the other vegetable cells just described, the protoplasm or living matter occurs as a delicate inner layer of the wall of the cell, and the cause of the currents is believed by many biologists to exist in the contractions of this delicate living cell-lining. This latter is a likely explanation, and in any case the origin of the movements may logically enough be referred to the protoplasm of the cell, for wherever this protoplasm exists, motion is its universal characteristic.

"Now this unceasing turmoil in the living contents of the cells of the nettle hairs, and of the cells of other plants, is to be regarded as by no means of singular occurrence in the plant world. On the contrary, we must consider these movements as universal in their nature. Wherever we find life there protoplasm must be; and the most exact observations show us that everywhere living protoplasm is in a state of constant movement. Just as the latest notion in physics resolves the gases or ether around us into a collection of ever-moving atoms, so in the world of life, incessant movement is the characteristic feature of protoplasm, and consequently of life. Extending our view from the pond weed and the nettle over the whole vegetable kingdom, we come to see that incessant motion must be as much the heritage of plant life as of animal existence. From the fungus or the lichen, staining the wall with its pleasant hues, to the lordly oak—from the humble moss to the giant sequoia of California itself, towering its head some hundreds of feet above the soil—we may discover no break in the sequence which connects life with movement as its unfailing accompaniment. The tree or the moss gives no outward sign of vitality, it is true; slow growth and the changes of leaf, flower, and fruit, marking the progress of the seasons are but passive marks of life after all. But hidden within the tissues of lichen, moss, tree, and flower alike, all invisible to the unassisted sight, are not merely probabilities, but realities of living movement. Coursing through the living contents, or protoplasm, of cells and vessels, are these wondrous currents, carrying with themselves the vested interests of plant nourishment and of plant sensation likewise. So that the great forest,

through which no sound passes save the sigh of the wind, the hum of insects, or the chirp of birds, is in reality a great repository of movement; and the truth of the idea becomes plain, that, were our hearing powers magnified as our powers of sight may through the microscope be increased, we might be stunned by the sound of these life currents 'as with the roar of a great city.'"

Let us now return to the acorn and see what changes are taking place in it. Here we find that warmth and moisture have expanded its wrappings and, aided by the oxygen of the air, gradually converted these into soluble infant food for the plant, until it finally becomes entirely dependent for its nourishment upon the soil. But this seed was first protoplasm only, which developed into cells, then into a solid firm seed, in order to become a tree; the order of development has now to be somewhat reversed. All had to be expanded and changed into cells. The living germs had to be stirred up into activity. Protoplasm has to go on multiplying itself, as well as cells, a circulating fluid or sap (said to be somewhat analogous to that of blood in animals) had to be started. Let us now study this life throughout its various phases, and endeavour to understand all that interferes with its economic and healthy exercise.

As the acorn expands, its substances become gradually converted into soluble plant food until all is dissolved, which the embryo plant absorbs through its tissues, and there elaborates it into sap, before any green leaf appears by which it can be exposed to light and air. This sap chiefly consists of water as its base, having some carbonic acid, ammonia, and a very small proportion of mineral ingredients mixed together in a liquid state. The presence of these minerals is necessary to the plant's healthy existence. That the acorn is becoming a thing of life we know by the soft white tender root it has passed into the soil, and the leaf it is so industriously sending up into air and sunshine. If this root and leaf are examined by the aid of a microscope, they will be found to consist of minute cells adhering to each other, which may be compared to a common sponge; each cell of which possesses an independent life of its own, which it exercises on behalf of its own personal comfort and development; and also for the propagation of other cells, and the general good of the commonwealth or tree, of which it forms a member, by passing on and upwards this liquid material, so that each of many millions may have an opportunity of doing that part of the work assigned to it, in the manufacture of the various materials required for the construction of the tree, and of laying them unerringly in the proper places for a firm, stiff, and stable oak.

The baby-food of this young plant may be now exhausted, and it may, like the most of us, have to toil in soil and air for its living. Let us now see what it gets there for its toil to feed upon.

If we cut down as much growing oak as will weigh say 20,000 Troy grains.

We may find on drying this quantity at 212° Fahr.

(the temperature of boiling water) that it loses in
evaporation 10,000

Leaving of perfectly dry timber 10,000

Being composed of the following organic simple elements:—

Carbon or charcoal extracted by the plant from 4,900

carbonic acid 600

Hydrogen, extracted from water 4,400

Oxygen

Nitrogen, taken from ammonia or nitric acid, strong traces.

Total organic substances 9,900

Leaving ashes to the amount of 100 . 10,000

These ashes may be composed of:—

Potash 8·00

Soda 6·00

Lime 75·00

Magnesia 4·00

Chlorine 0·05

Oxide of Iron 1·00

Phosphoric acid 3·45

Sulphuric acid 1·20

Silica 1·30

100·00

According to this, about the one-half, or fifty per cent. of green growing timber is water, of which we have often far too much in our soils. About the one-hundredth part, or one per cent. of perfectly dry timber is ashes, consisting of the relative simple elements we have just enumerated. No matter what the advantages a soil may possess, if totally wanting in any of these simple elements it must be poor.

Here we may remark that what we have just said regarding this tree may, with various modifications, be said of all perfect flowering plants, from that "wee modest crimson-tipped flower," the mountain daisy, up to this venerable oak. All begin with protoplasm, a stage at which the keenest scrutiny of man is baffled in discovering which is that of the oak, or that of the daisy, and yet this leads to the formation of pollen and other cells, up to seed, where distinctions first really begin. Each requires the same description of organic and mineral, or inorganic food, though in proportions varying as much, perhaps, as that required by the antler-headed stag, when compared to the little timid rabbit.

As the external cells of roots, branches, and leaves of trees, are far too small to permit the absorption of plant food in any other than in that of a gaseous or fluid state, we will in the next paper endeavour to form some accurate idea of what proportion of water composes tree-sap.

(*To be continued.*)

THE FORESTS AT THE CAPE OF GOOD HOPE.

THE following brief sketch of the Cape Forests, taken from a private letter, may prove of interest:—

“The commencement of a forest service at the Cape received at first some opposition in the Parliament, as the forests themselves were regarded as possible fields of speculation, and there were knowing people about who had an eye on getting hold of them cheap. The principal forests are found in the Knysna Division, two days’ journey from Mossel Bay. They are managed by Captain Harrison, as Conservator. They contain one very valuable tree—the ‘Stink wood,’ which is somewhat similar to the oak in quality. It forms only about 4 per cent. of the forests; with it there is plenty of yellow-wood, the silver fir of these countries, and several other species more or less useful. The only attempt at forest management consists in delivering licences to fell timber which are usable at the discretion of the holder. Naturally everyone takes the best tree that he finds for his purpose, wherever it may be; and when the Forest Officer considers that the block of forest has been sufficiently worked, he closes it, leaving the whole in the most horrible disorder. The forest fires also often cause terrible ravages. The Conservancy of Knysna, which comprises at least 200,000 acres of woodland, of which about the half is really fine forest, is the best ordered of all the divisions.

“I next visited the forests of Alexandria and the Divisions in the neighbourhood of Port Elizabeth. There are here also above 200,000 acres of woodland, which are very badly managed by a Ranger—or rather not managed at all. Further east there is the Division of King William’s Town. Here the forests are less extensive, but of better quality. The Conservator is the Baron de Fin, an old officer of the German Legion, now 84 years old, which, however, does not prevent his still going on horseback into the mountains. Further east there are the forests of Stockendion and Victoria East, under a Ranger, like those of Alexandria. Near Cape Town there are some reboisements on the sand-hills which are in charge of a Superintendent of Plantations.

“The Cape Colony is traversed by ranges of mountains entirely destitute of wood. The country in consequence often suffers from drought.

“So far as can be judged from a rapid survey, the forests of the Cape Colony consist of about 800,000 acres of woodland, of which about 200,000 are really fine high timber forests—the rest but indifferent.

There are above ten millions of acres of mountains and plateaux which would benefit if they were covered by forests.

"There are five forest Divisions which ought each to have a Conservator. The service is under the direction of the Commissioner of Crown Lands and Public Works."

G. F. PEARSON.

REMEDIES FOR AGRICULTURAL DEPRESSION.

IT is not with the hope of advancing anything new in the shape of a remedy for the existing acute depression in agricultural matters that I venture to put before the readers of this *Journal* the following remarks; but, engaged as I am, practically, in farming and general estate supervision in a district of the country which has suffered severely from the prevailing depression, I offer a few remarks on some of the proposed remedies, from that point of view which may be described as being least popular, and which is less prominently put forward.

No one has been too high or too low to propound a remedy, from the Prime Minister to the loungee in the village beerhouse; and the importance of the subject may well claim the attention of the most gifted counsellors the land contains. We are told that "In the multitude of counsellors there is wisdom," but in this instance it must be confessed there is also much foolishness.

We may in the first place notice briefly some of the remedies proposed in this *Journal*. In the August number Mr. Smith gives us three remedies, viz., "A produce rental," "Smaller holdings," and "Fixity of tenure." In regard to the first, Mr. Smith explains it to mean, that the landlord shall have one-third of the produce gathered from the fields for rent. Bad as the state of agriculture has been during the last few years, it has to descend a long way further down the declivity of adversity before such a proposal can be adopted. Such an arrangement would form a premium for slovenly farming. Why need a tenant in that case trouble himself about either seed-time or harvest, or what interest has he to make the best of his land? It is said such an arrangement is offered on American farms, but it must be kept in mind the features of American farming are very different from English farming. There it is simply a matter of sowing and reaping, without the expense of artificial manures and heavy labour bills for cleaning, &c. No doubt many landlords during late years would have been glad to have accepted a third of the produce as rent, but the proposal is radically bad, and it may well be said of

it what Lord Derby said at Liverpool lately of some other proposals regarding the land question, "It will keep."

"Smaller holdings." Many others as well as Mr. Smith have spoken in favour of this proposal, and in certain districts, and on certain descriptions of soil, there is no doubt it would be a step in the right direction. On strong clay soils it is the best thing that can be done. In those districts suited for sheep farming there is more inducement and security for capitalists to lay out their money, and in such cases large farms will probably answer as well in the future as they have done in the past.

"Fixity of tenure." This seems a phrase imported from our "wayward sister" across the Channel, and an importation which can honestly be dispensed with.

I fail to see how any such claim can be put forward by tenants. If they farm under a lease for a certain number of years they would certainly have fixity of tenure during the currency of the lease, but upon its termination the transaction is at an end, as much as a contract for a certain number of years by a colliery owner to supply a large establishment with coal would cease at the end of the period for which he contracted.

Another remedy suggested, is a change in the system of cropping. The farmer is told to change the corn-fields into flats of strawberries and onions, and grow roses, geraniums, and pansies instead of so much wheat, beans, and oats.

As a class, farmers are accused of being slow, and difficult to impress with any new idea, and it probably suits their profession better than rushing one day to extremes, and having to retrace their steps another, as any experiments in cropping require several years before it can be determined whether they will succeed or not. Unless for suburban farmers, growing flowers and vegetables instead of corn is quite impracticable. We are aware of farmers in the neighbourhood of large towns who find it profitable to go in for a mixed system of farming, combining market gardening with ordinary farm practice. But it is just farmers so situated who have never felt the depression; and they are exceptionably situated for procuring abundant labour, without which such a system of farming cannot be successfully carried out.

But even with the present supply of fruit and vegetables, we often find markets glutted, and these goods being of a perishable nature, they have either to be sold at a great sacrifice or go to waste. It may be as well to consider if the growing of corn is in so hopeless a case as to warrant the complete change of our system of cropping, and as regards a large proportion of our arable land, I have no hesitation in saying that it is not. On all land capable of growing a crop each

year, with ordinary seasons, corn will continue to be grown at a profit as it has hitherto been.

Seeing that bread is one of the chief necessities of our every-day life, if anything in the future can be depended on it is a demand for wheat. Oh! but, we hear on every side, you cannot compete with America for wheat-growing; but I for one do not believe in that cry. One meets with old farmers at every turn who tell of lower prices than the average of even the last three years.

Last year wheat-growing in England paid, in most cases, where it was not injured by the heavy floods of last autumn; and had the harvest weather been more favourable, it would have paid much better, and the average price would probably have been three shillings per quarter higher.

On heavy clay soils where it is necessary to have recourse to bare fallows every four years to keep the land clean, the prospects for corn-growing on the old lines are not very bright; and the remedy seems to point in the direction of leaving clover lays longer down, and also in turning a certain proportion of the arable land into permanent pasture.

That there are gentlemen of great experience who disbelieve in any great revolution in the present system of cropping, is shown in a recent speech of Mr. Caird's. He says: "Mixed husbandry, corn and cattle, will continue to hold their ground. Our cattle cannot be reared without winter fodder, and that can be most cheaply found in the straw of the corn crops, which at once supplies food and yields manure." And again he says there will be "no need to convert the surface of England into a vast grass-field."

"Tenant-right." This is perhaps the chief remedy advanced by platform orators and others as likely to cure the existing depression; but to work any law of that kind in a spirit of justice there must also be "landlord-right." If a tenant leaves a farm in a dilapidated condition he would have to pay the landlord for the depreciation in the letting value of the land.

We hear a great deal of tenants working vast improvements on their farms during a term of years, but we do not always hear of the arrangements made at the beginning of the lease, and of the rent specially agreed for, so that the improvements might be carried out. And from landlords not talking so loudly, or writing so frequently in public papers of their private business affairs, we also hear little of the equally numerous class of tenants who in a like time deteriorate the condition of their farms.

Mr. Lawes, in his evidence before the Royal Agricultural Commission, limits the improvements which he thinks tenants entitled to compensation for, to their actual outlay for manures, &c., for which

they have not got full value at the end of their lease, and to that there does not seem much objection if a satisfactory valuation could be made. It seems to me that what are by many termed tenant's improvements are often due, in a great measure, to the influence of the season. Let us suppose a tenant entering on a farm in 1870, and leaving it in 1881; the valuers found when the tenant entered that the land was beautifully clean and growing large crops of all kinds of corn; but, from no fault of his, when he gave up the farm, it was foul, and crops of all descriptions were very deficient, and this notwithstanding high-class farming.

That this has been literally the case will be generally allowed. In such circumstances would tenants be prepared to pay to their landlords the difference in value between the condition of the farm when they entered and when they left? And if not, on what principle could they claim compensation if the case had been reversed? On this point Mr. Lawes said, the natural fertility of the soil suffered "very much" from the six wet seasons, and further, "what is washed out is not so much the natural fertility of the soil as it is the farmers' fertility."

If the fertility is washed out of the soil, how can a landlord be asked to pay for it?

The extreme difficulty of arriving at a satisfactory valuation has been recognised by several tenant farmers of good position, who have at meetings of their class given it as their opinion that there should be no valuation of unexhausted manures, but that tenants farming under a lease should give or receive three years' notice to quit. During which time it is argued they can get out of the soil what unexhausted manure they may have in it.

An illustration of the extreme difficulty of making a satisfactory valuation is supplied by the recent case of revaluing a farm belonging to the Earl of Dalhousie, in Midlothian. Speaking at a meeting of his tenantry at Arbroath, in December last, his lordship told them that the farm was valued by two experienced agriculturists, one of whom put the rent at £1,425, and the other at £875 with a large expenditure for buildings; and to complete the case the occupying tenant offered £1,050.

Having lived in a district where something like what is known as the Lincolnshire Custom of tenant-right exists, it has occurred to me that it rather infuses a spirit of change into tenants. A farm is taken for a year or two as a kind of speculation; that is, if a farm from any cause can be taken at a light valuation, the tenant has a chance of leaving in two or three years with a greatly increased valuation. At the present day the great want does not appear so much the want of security for invested capital as the want of the capital itself.

COPSE-WOOD IN HAMPSHIRE.

THE underwood in this county is of considerable extent, and consists of hazel, ash, oak, maple, beech, alder, birch, sweet chestnut, holly, willow of sorts, skewer wood (*Euonymus Europæus*), dogwood (*Cornus sanguinea*), elder, wild cherry, white-thorn (*Cratægus oxyantha*), blackthorn (*Prunus communis*), bird-cherry, or black dogwood (*Prunus padus*), copse elder (*Viburnum latana* and *opulus*), sycamore, mountain ash, or scatter ash, privet, buckthorn (*Rhamnus catharticus*), pear and crab apple.

Copsewood is cut at from seven to fourteen years' growth, the most common age being from eight to twelve; the hook used for this purpose is shown in the drawing, and is a very useful and handy implement for such work; the shoots are cut upwards with a clean cut, which is important, inasmuch as it leaves no cracks in the stool left for a succession, and in few counties is there so much skill displayed as in Hampshire in utting and sorting the wood for the various uses, and in utilizing the whole.



Hazel is the most plentiful as well as the most useful of all the underwoods; it makes the best hoops, hurdles, spars, crate rods, pea stakes, withes, &c.

Ash is not so common, but is valuable for its quick growth, and the uses it is fit for, which are hop poles, hoops, hurdles, sheep cages, scarlet runner bean stakes, &c.

Oak is not so useful as ash, but some of it comes in for hoops, hurdles, bean stakes, withes, faggots, &c.

Maple is rather plentiful, but is little used; occasionally for hoops, hurdles, stakes for fencing, faggots, and bavins.

Beech is of very little use except for pea stakes, faggots, &c.

Alder comes in for hop poles, broom and mop handles, and for gunpowder wood; when it reaches the size of 3 in. in diameter it comes in for the manufacture of toys, &c. Alder, in consequence of its quick growth, is valuable as underwood, but not on account of the number of purposes it is used for. The following is taken from Pott's *Farmers' Cyclopædia*, published in 1807. "A friend of mine had a small piece of marshy ground, the produce of which never made him a shilling. He had some thoughts of draining it, but on my recommendation he planted it with alders. The extent of it was something less than an acre, and the whole expense of planting cost no more than 20s. In five years he cut them over, taking down every third or fourth plant. These poles produced him 50s., and the

loppings for fuel more than repaid the expenses of cutting down. In six years more they were grown so strong and large that he was under the necessity of taking down half the remainder, these were, of course, the weakest trees. They produced in bark and wood £8 14s. It is three years since the last felling, and the rest, on a moderate calculation, have been estimated at £13, exclusive of the young poles or shoots. Thus in fourteen years from the planting a piece of swamp rather less than an acre, which had before been totally unproductive to the owner, there has been already received £11 4s., and timber is now standing to the estimate of £13 more, in all £24 4s., or £1 14s. 7d. yearly."

Birch grows nearly as rapid as alder, and comes in for hop poles, hoops, hurdles, brooms, broom and mop handles, bean stakes, faggots, &c.

Sweet chestnut is a valuable copsewood in consequence of its quick and straight clean growth, making the best hop poles, hoops, and hurdles.

Holly may produce a few walking-sticks or whip handles, but is usually made into bavins of not much value, and it might as well be left to come in for use as timber or for ornament by the rides, indeed, on several estates it is a condition that it shall be left when the rest of the underwood is sold.

Some of the best sort of willows are made into hoops, hurdles, bean stakes, and crate rods.

Skewer wood, as its name implies, is a capital wood for butchers' skewers, being tasteless, easily split, and clean in the grain; it grows best on a chalk subsoil.

Dogwood is used for spars, withes, &c.

Elder is considered of little value, although no wood lasts longer as fencing stakes, &c., partaking as it does much of the nature and consistency of boxwood.

Wild cherry is plentiful in some copses, and comes in for hop poles, hoops, hurdles, &c.

White and black thorn may produce a few walking-sticks, but are chiefly used for making dead hedges, which form an effective fence against sheep for a few years; when made into bavins they are used bottoms to hayricks, &c.

Bird-cherry, or what is locally called "black dogwood," is the wood for gunpowder.

Copse elders make a light walking-stick, and the top is easily fashioned into shapes, otherwise it is put to no special use.

Sycamore does not often occur, but may answer along with other wood for hoops, &c.

Mountain ash, locally called "scatter ash," is of little repute

amongst wood workers, although from its tough nature and straight clean growth, it might be supposed to be useful for hoops, hurdles, &c.

Privet is rather common, but of no special use.

Buckthorn occurs sparsely, and is said to make the best gunpowder wood.

Crab apple is made into walking-sticks, but it is best to leave the finest sticks, as they form a very ornamental tree when in full blossom.

The above is an exhaustive list of the varieties of underwood to be found in the coppices, all of which (with the exception of sweet chestnut) are indigenous to Hampshire, and the different wood goods may be catalogued as follows :—

1st, Hoops, which are made from $4\frac{1}{2}$ ft. to 14 ft. in length; some are left straight, whilst others are bent. 2nd, Hurdles for folding sheep; these are preferable to netting or iron hurdles, in that they afford a better protection and shelter for sheep; they are also used for lining the holds of ships. 3rd, Crate rods, for making crates for crockery-ware, &c. 4th, Pea stakes. 5th, Spars for thatching. 6th, Withes for tying faggots, &c. 7th, Hop poles. 8th, Brooms. 9th, Broom and mop handles. 10th, Scarlet runner bean stakes. 11th, Walking-sticks. 12th, Whip handles. 13th, Sheep cages, used as racks for hay in the fold, and being light in weight are to be preferred to any other. 14th, Skewers for butchers. 15th, Wood for gunpowder. 16th, Faggots of sorts, principally what is called copse and frame faggots, the latter being made in a frame of the largest and best wood for heating bakers' ovens. 17th, Bavins are the faggots of the smaller wood, and out of which are made the small match faggots for lighting fires; but not directly in the copse. This shows the various uses of underwood, and that many articles of common sale are made therefrom. It has now become a question for landowners to consider how far the growth of wood can be extended so as to benefit their estates, and in doing so one advantage it has over other crops has to be noticed, and that is that there is almost no risk of failure, and therefore it constitutes a more certain means of income than from any other produce of land whatsoever. It is true there are times of depression of prices as in all other things, but then a cutting can be deferred for a year or two without injury to the crop, and until a higher price can be obtained. On every well-managed estates the underwood fit for cutting does not all come to hand in one year, a constant succession being kept up from year to year, so as to constitute a regular yearly income.

From careful calculations that have been made of the profit on a cutting of underwood it is found that it ranges from 5s. to 15s. per acre per annum, this is leaving out of the question the crop of timber

which is gradually coming on in the coppices where the underwood grows. This profit is not so high as stated by some, as for example, in the above quotation from the *Farmers' Cyclopædia* as to alder; still there are few landowners who would not appreciate a clear income of, say, 10s. per acre from their estates. The underwood in Hampshire is generally sold by auction and will fetch from £2 to £8 per acre, so much depending upon age, situation, quality and crop, the buyer of course doing all the labour of cutting and converting. As to the manner of extending woodlands, little that is really new can be said, merely noticing that the most useful sorts of underwood are hazel, ash, alder, sweet chestnut, and birch; along with these oak and ash should be the most prominent timber trees, as in all woodlands it is most desirable to have timber coming on with the underwood, because, although it may injure it to a certain extent, it is wise to have "two strings to your bow." But every landowner who is intending to increase his coppice land should take the advice of those competent to give such advice, and, after all, much will depend on the after management.

Many who are well acquainted with the management of agricultural land, or, in other words, good farmers, are often deficient in the knowledge requisite for the proper supervision of woodlands, and this is not surprising, seeing that for the last thirty years or so, the aim has been how to diminish the extent of such so as to add to the tillage land, and even lately in the pages of the *Journal* advice has been given to get rid of the hedgerows as much as possible, almost reckoning them so much waste, whereas it is evident that the extent of what may be called cleared land is at present in excess of what is required or there is any demand for, and the better advice would be to make the most of what you already have before adding to the acreage of such land. However, on the other hand, it would not be wise to extend to excess the woodlands, as thereby you might commit the mistake of "putting all the eggs in one basket." But the first expense of extending them will act as a preventive to this, while other things should be taken into consideration, such as the facility of marketing the goods; and, in consequence of the rage for grubbing up the woodlands already referred to, wood-workers are become more scarce and of course require more wages, and in some places the hoop-shaver and hurdle-maker are now extinct. This must all be considered before much is done, still, in most localities a good deal can be done with safety, and as an illustration of what might be undertaken I take the example of a farm of nearly 200 acres which came under my own observation, the rent of it being £120. It consists of very fair old meadow and some easily worked arable, while nearly 70 acres of it consisted of a stiff wet clay, and the proposal was

made to the tenant, who held under lease, to take away the 70 acres or so and plant it, and the rest, with the house and homestead, to be retained by him at a rent of £100, or £20 less than the rent reserved in the lease for the whole farm. To do this he was willing, and the arrangement would have been carried out, but unfortunately the owner was a minor, and his trustees could not see their way to make the alteration proposed, although they would have lost only £20 per annum in money, whilst on the other hand they would have come into possession of 70 acres for planting, which, at a low estimate, would have been worth in eight years £2 per acre or 5s. per annum. This may be taken as one example, and there is no doubt there are many more farms that could be altered without greatly disturbing the existing arrangements of estates, and it is a matter which should engage the attention of all owning or having the management of landed property, for there seems to be a consensus of opinions that for some years to come tillage land will not be so profitable as woodland to the owner of land.

The above was written before perusing the article entitled "Profitable Planting," by "H. E.," in the February No. of the *Journal*, but while agreeing in its principle, I cannot see that the planting at "Cowdray Park," mentioned at p. 703, is an example of "profitable planting," for if we take a Dr. and Cr. account per acre, it certainly appears more like *unprofitable* planting. Here is is :—

	£	s.	d.
To trenching one acre at 2s. per rod	16	0	0
„ 4,858 trees at 35s. per 1,000, say 5,000 ...	8	15	0
„ digging 4,858 holes at 9d. per 100 ...	1	16	4
Total ...	£26	11	4

The interest and compound interest at 5 per cent. on this sum for eight years amount to £39 4s. 7d., to which has to be added at least 24s. for "cutting down brambles or other rubbish," and the plants when planted three years. Again, nothing is said as to the planting, and I take it that digging the holes is not *planting*, at any rate I have paid 1s. per 100 for hole digging; however, taking the statement as it stands, the total is £40 8s. 7d., while on the credit side there is only £10, leaving for profit and loss for the loss £30 8s. 7d.; it is true the next two cuttings will show a better balance-sheet, but whatever "H. E." may think, it does not look like a profitable investment; and although I am not exactly like the Irishman who when advised to plant, replied that planting would not benefit him; and when told that it would benefit posterity, "Ha," said Pat, "faith an' I'll wait to see what posterity does for me," still I think that the planter should have a reasonable prospect of reaping some benefit. I do not recommend a large preliminary outlay for one particular reason,

and it is that the majority of landowners cannot afford to do it, even though it would be an advantage some 25 or 30 years hence, and every suggestion that involves a large outlay per acre at the commencement is not of general utility.

JOHN SMITH.

PARASITICAL PLANTS.

FEW British plants are more interesting, and at the same time more destructive, than the several genera of which this order is composed, the principal of which are the Dodder (*Ouscuta*), Broom-rape (*Orobanche*), Tooth-wort (*Lathæra*) and Mistletoe (*Viscum album*).

These are at once rendered both interesting and curious, from the fact of their living on and deriving their sustenance from other plants, to which they prove destructive, as not unfrequently whole crops of flax, clover, lucerne, &c., are destroyed by these parasites (chiefly the different species of Dodder and Broom-rapes) draining, as it were, the heart-blood from their benefactors—indeed, to such an extent do the ravages of these plants prevail, that in some places, especially Flanders, they deter the farmers altogether from the cultivation of clover.

Parasitic plants may be divided into two kinds, viz., those that attach themselves to the roots of different plants, as the Broom-rapes and Tooth-wort, hence called root-parasites, and those that live on the stem or branches, as the Mistletoe and Dadders. These plants also present the remarkable peculiarity that each species is generally confined to or lives on the same species of plants, thus, the *Orobanche rubra* feeds upon thyme; the *O. ramosa* on hemp and lucerne; *O. major* on broom and furze; *O. minor* upon red clover, and *O. elatior* upon various species of compositæ as Centuary and Milfoil. The different species of *Orobanche* are fleshy herbs with tuberous roots, and never truly green, but generally of a russet colour. They are destitute of leaves, but covered instead with numerous small, fleshy, scales.

The *Cuscuta* or Dadders twine themselves around the stem and branches of other plants, and become attached to them by means of suckers, and thus attract from the system of the plant the air and sustenance necessary to their own support. They possess the double power of germinating either in the capsule or the earth; in the latter case they adhere to the ground by the original root, drawing nourishment therefrom until the young stem has fixed itself to another plant, after which the original root withers away. The Dadders spread with terrible rapidity, and are often the source of great annoyance to the husbandman, especially in the cultivation of leguminous

crops, their ravages being almost as much dreaded as a flight of locusts. They destroy the plants either by depriving them of their nourishment, or by strangling them in their folds. *Cuscuta Europæa* is generally to be met with in hedges, growing on brambles, nettles, and grass; also on flax, hemp, and clover. *C. Epithymum* grows on thyme, heath, and other small shrubby plants. The *Cuscuta*, like the *Orobanches*, are destitute of leaves, but supplied with tiny scales instead. The small bell-shaped flowers are very pretty, especially that of *C. reflexa*, and amply repay any extra trouble bestowed on the cultivation of these plants.

The Tooth-wort, *Lathæra squamaria*, grows parasitically on the roots of different trees, as the hazel, laurel, &c., and is generally found in the most hidden recesses of dry woods. It is a diminutive plant, covered with numerous white fleshy scales instead of leaves, and produces greenish-coloured flowers in April. It is the only species of the genus.

The Mistletoe is the largest and most aspiring of our native parasites, and is by some considered as the only true parasitical plant indigenous to Britain, as at no time does it receive any nourishment from the soil, like the several species already described; but although the Dodders and Broom-rapes do not actually, like the Mistletoe, plunge their roots into the wood, and incorporate themselves with the tissue, still the fact of their living on and drawing nourishment from other plants will be sufficient reason for including them in this class. The Mistletoe is generally found growing on the apple tree, but it will grow on various others, as the oak, thorn, maple, poplar, lime, and in a few places on the Continent is found abundantly on the Scotch fir.

It is a pendant, evergreen bush, from two to sometimes five feet in diameter, with dichotomous shoots and pairs of light green leaves. It flowers in spring, and is usually covered during winter with small white glutinous berries, not unlike tiny pearls. It is easily propagated by inserting the bruised berries into crevices of the bark in spring—the glutinous matter of the fruit aiding in attaching it—and tying a small piece of matting or other material over, as a preservative against birds. The seed is not long in germinating, the radicle penetrating into one of the numerous chinks of the bark, settles between the bark and wood of the sustaining tree, and finally insinuating its fibres into the woody substance soon becomes one with its foster parent, deriving the ready-made nourishment therefrom necessary for its own support.

ANGUS D. WEBSTER.

FORESTS AND WATERCOURSES.

THE rapid destruction of American forests has at last begun to attract great attention, and the efforts of those who would endeavour to awaken public interest in the preservation of the standing trees, and to promote their cultivation where none exist, are now beginning to bear fruit, especially in the prairie States of the West and North-west. The arguments used are generally such as may be embraced in the question—What shall we do for fuel, for fences, for ships, for building material, for railroad ties, and for the innumerable industries of which wood forms a part, when these forests have entirely disappeared? The American Scientific Association have just been discussing the question, and from the reports of this discussion it is very clear that these arguments are by no means the most important ones that can be used against wholesale forest denudation. For all the purposes named it is quite possible, nay, probable, that substitutes may be found. But there are other uses for forest trees, and for which nothing else can take their place. Possibly the most important among these is the influence of forests, and the effect of their removal upon watercourses, such as lakes, rivers, creeks, and brooks, and also upon springs and wells. Trees during a rain-storm retain a vast quantity of water. Fantrat found that the soil covered with forests received six-tenths of the whole rainfall, the trees having intercepted four-tenths. The proportion, however, will vary, depending largely upon the character of the foliage and the nearness of the trees to each other. Besides what is retained by the branches and leaves, the roots, by keeping the soil around them loosened, induce the speedy absorption of the larger part of the rain which reaches the ground, and much of which, but for the trees and their effect upon the soil, would immediately flow away. The foliage of the trees, by partially or wholly excluding the sun's rays, prevents in a larger degree the evaporation of the water in the soil, which in a treeless region soon renders the ground as destitute of moisture as though no rain had fallen. By the absorption of rain as it falls, the flooding of the streams is largely prevented; and by retaining the water in this natural reservoir, and allowing it to flow off gradually, the streams are supplied with water continuously. It may safely be affirmed that no stream having its source near a tract of forest has ever ceased to flow.

With these general principles in mind, we can trace the cause of much trouble in many of the American States. In the early history

of the Eastern and middle States, a farm was regarded as lacking in an essential feature if there were no spring upon it, and the farmer's wife would as much expect to do without milk-pans as to do without a spring-house. But now a spring-house is a rare sight. When the pioneers settled on these lands, they were covered with forests, and the first and most important work of the new settler was to cut away the timber in order to get land upon which to raise food for himself and family. For many years there was, of course, no apparent effect upon the watercourses; but as the number of settlers increased, and the amount of forest land decreased, the springs began to dry up, and with them the brooks, creeks, and smaller rivers. It is not unusual to find in many localities the beds of what were once important mill-streams waterless, except when filled by sudden freshlets; and in the State of New York there are certain streams emptying into lakes, which were once declared navigable, but which will not now float a canoe. Previous to 1832, a Captain Delonace, of Hamilton, Ohio, annually sent a fleet of flat boats down the Big Miami River at the spring rise; but with the destruction of the forests along that river, the rise became so uncertain that the enterprise had to be of necessity abandoned. Professor Newberry in his "Geology of Ohio," states that the Ohio River has been getting lower and lower in dry seasons for many years. About 1871-72 the Ohio sank lower than had ever been known before, and at Smith's Ferry, where the Pennsylvania line crosses, a ledge of rocks was laid bare that had not been seen or heard of by any people living in that vicinity. Lapham says that "such have been the changes in the flow of the Milwaukee River, even while the area from which it receives its supply is but partially cleared, that the proprietors of most of the mills and factories have found it necessary to resort to the use of steam, at a largely increased yearly cost, to supply the deficiency of water-power in dry seasons of the year. The floods of spring are increased until they are sufficient to carry away bridges and dams, before deemed secure against their ravages. What has happened to the Milwaukee River has happened to all other watercourses in the States from whose banks the forests have been removed, and many farmers who have selected land upon which there was a living brook of clear, pure water, now find that the brooks dry up during a considerable portion of the year." Even in the State of Tennessee, where comparatively but little of the original timber has been cut, the same results are manifest. The Hon. J. B. Killebrew, late Commissioner of Agriculture of that State, relates that upon visiting the home of his childhood a short time ago, he was surprised to find that what but thirty years previously was a considerable stream flowing through his

father's farm, had entirely disappeared, and its former bed had been ploughed up. The reason for this he found to be the removal of the forests along its banks. In Cincinnati, also, there is a striking example of the total disappearance of a running stream. Deer Creek, in the boyhood of residents of the city now only in middle age, flowed with a stream of sufficient volume to turn a mill. The denuding of the hillside, and the consequent exposure of the entire surface to the rays of the sun, have dried up the springs that originally fed it, and no water now flows where the stream was but so few years ago.

Thus it is seen that the denuding of the forest lands has a very marked effect on the physical conditions of the country. During rainy seasons floods are more common, but the general effect is the drying up and total extinction of the watercourses of the surrounding country.

H. F. M.

THE ROYAL OAK AND BOSCOBEL.

FOR many years after the building of Boscobel House its existence was known to very few besides its owner and some occasional refugees who found shelter in its hiding-places. It lay concealed in the middle of Brewood Forest, visible only from one part of the road leading from Tong to Brewood.

Among the gentlemen who escorted Charles the Second in his flight from Worcester, were Lord Derby and Mr. Giffard, of Chillington, near Boscobel, the owner of the estate. Lord Derby having recommended Boscobel as a place of immediate refuge, where he had himself been concealed, Mr. Giffard undertook the duties of a guide. The road was obscure and darkness was setting in. At Kinver Heath, a spot not far from Kidderminster, daylight entirely failed. At Stourbridge a troop of the enemy's horse was quartered, but the party, including the king, the Duke of Buckingham, Lords Derby, Wilmot, Lauderdale, and Talbot, passed through the place without being molested, and arrived at a house a mile from the town, where they pulled up and obtained refreshment. At daybreak the cavalcade reached White Ladies, a house of Mr. Giffard's, half a mile from Boscobel. George Penderel, the man in charge of this old place, opened the door at his master's summons. It was still dark. The king's horse was led into the hall; some of the cavaliers, stained with mud and marks of the recent battle, trooped into the parlour, and a few followed Charles into an inner chamber and there held a hasty council.

It was presently decided to entrust the king to the care of the

brothers Penderel, tenants and retainers of the Giffards, and George Penderel was sent off in haste to fetch his brothers. There were four brothers Penderel then living; George, Humphrey, who held the mill in the meadow below White Ladies, William, the eldest, who, with his wife, had charge of Boscobel, and Richard, commonly called "Trusty Richard," or "Trusty Dick," who occupied the farm of Hobbal Grange, a few fields distant. The two last-named brothers had been Lord Derby's protectors in his flight from Wiggan to Worcester. They presently crossed the parlour in their hob-nailed shoes and entered the inner chamber.

"This is the king," said Lord Derby, stating briefly the business in hand. "You must have a care of him and preserve him." Richard, being spokesman, replied, "Would his Majesty be pleased to smudge his face with a handful of soot from the chimney?" This was done, and his Majesty, laying aside his George and other conspicuous adornments, proceeded to disguise himself in a noggen shirt, belonging to the house-boy, Martin, a leathern doublet, green breeches, green jump coat, grey hat, and a pair of old shoes cut and slashed to ease his feet. He wore his own stockings minus their embroidered tops, and plus a pair of stirrup stockings. In this disguise he plunged at once into the woods with his conductors, and his escort rode off.

Day was breaking as they left, and soon after daybreak Colonel Ashenhurst and a troop of horse rode up to White Ladies and searched the premises, and then galloped across the wood to Boscobel, which they also searched, and during the next forty-eight hours Boscobel was continually visited and searched.

Adjoining the grounds of the old house, at the present time, is a pasture in which stands the Royal Oak, and beyond is Spring Coppice and "The Wood," a residence now owned by Mr. Francis Yates. In 1651 a farmhouse stood on this spot, occupied by Francis Yates, the husband of one of farmer Penderel's daughters.

As the sun rose, invisible amid pouring rain, a gentleman in a grey hat without a lining, sat beneath a tree in Spring Coppice.

"Would the gentleman step indoors?" inquired Mrs. Yates.

At this the gentleman seemed disturbed, and speaking of himself as "a poor Cavalier," begged Mrs. Yates not to betray him. Her reply was that she would die first.

The next night at nine o'clock, the king commenced an attempted flight into Wales, with "Trusty Richard" as his guide. He was compelled to undertake this journey on foot, in his jack-boots; and at the very commencement, in crossing a stream, some gravel got into these heavy boots and laid the foundation of some bad blisters. At Evelin Richard unluckily let a miller's gate swing heavily behind

him, and the miller, being a staunch royalist, and having a house full of royalists and fugitives, rushed into the road and shouted in the dark, "Who goes there?"

"Neighbours going home," was Penderel's reply.

"If you be neighbours," quoth the miller, "stand, or I will knock you down."

At this Richard took to flight, the king following, and the miller shouting "Rogues, rogues!" Coming to a gate they paused and looked around, and seeing some men at the mill, who looked like soldiers, they both took to flight again, and ran full speed up a dirty lane, and then clambering over a hedge, lay down and listened for half-an-hour. In a neighbouring wood Charles lost sight of his guide in the dark, and followed him some distance, along the narrow paths, by the sound of his calf-skin breeches, rustling as he strode alone.

At Madeley this trying march ended, and about midnight they knocked at the door of a royalist gentleman named Woolf, whose daughter asked some questions through the keyhole and then opened the door and gave the unexpected guest some supper. Charles was afterwards conducted to the barn, as the least suspected part of the premises, and there he remained until the evening of the following day, when his host brought him intelligence of the desperate hazards of his proposed journey. He had ascertained that the route into Wales was closely watched, and the bridges over the Severn guarded, that all boats attempting to cross were seized, and that troopers were engaged searching all suspected houses in that immediate neighbourhood.

Under these circumstances Charles returned to Boscobel with Richard, on foot, as before. They left Madeley at eleven o'clock p.m., and at three on the Saturday morning were in the wood outside the garden gate. A visitor had arrived in their absence. The king's faithful adherent, Colonel Carlis, had been the last to quit the field at Worcester, where he had seen the last blow struck and the last man fall. He had safely arrived at Boscobel. The king was conducted through the garden, limping and leaning on this latest defender of his cause, with Richard and William following in the rear. Those who have seen the wainscoted and cosy room on the ground floor, remaining much as Charles found it in 1651, may easily imagine the scene that followed.

The first thing was to relieve the smarting feet, and for that purpose William's wife came forward with hot water, and on seeing the feet, ejaculated, "Poor thing!" and began sopping them with a rag. She next warmed his stockings at the fire and then drew them gently on, ejaculating, "Poor thing!" His jack-boots were the only

boots in the house the king could by any possibility limp off in for his life in, case of emergency, and the good wife dried them with hot embers from the fire, well shaken about in them, and then set them aside. All was prepared for flight when the king sat down to supper, having broiled the mutton-chops himself in the wainscoted parlour. In safer times Charles used to tell the story of that eventful night—the jack-boots dried with hot embers, the preliminary posset before supper, the chops to follow, and then, following the chops, the alarm of troopers brought by the ever-watchful Dick, and after that the escape into the tree in the wood, the “Royal Oak,” with ivied trunk and thickly-branched head.

In the best room upstairs, close to the fire-place, there is at present a closet which at that time was concealed behind a panel, and communicated with the garden by a passage. The escape was effected here. The spring was pressed, the panel opened, and the king hurried away to the tree, where he sat upon a cushion, Carlis by his side. Mr. Thomas Blount, of the Inner Temple, published a pamphlet at the Restoration, containing an account of the “miraculous escapes of King Charles.” “The colonel,” says Mr. Blount, “humbly desired his Majesty (who had taken little or no rest the two preceding nights) to seat himself as easily as he could in the tree, and rest his head on the colonel’s lap, who was watchful that his Majesty might not fall.” He had been completely exhausted, and having sufficiently supped and dined, he napped and slumbered in the Royal Oak during the remainder of the night and the greater part of the following day.

To continue this exact narrative it must be mentioned here that on the Saturday morning, at about 4 o’clock, Will Penderel shaved his Majesty and cut his hair, which he did in country fashion, short at top as scissors would cut, leaving some longer hair about the ears. During Saturday Humphrey Penderel, going to Shiffnal to pay some taxes, was apprehended by Captain Broadway, who had heard of the sixty horsemen at White Ladies. The penalty for concealing the king was death, the reward for discovering him £1,000, and these facts were urged upon the miller strongly. Pleading entire ignorance, however, he was dismissed, and came at once to Boscobel to relate what had passed.

On Saturday night, Dame Joan—Will’s wife—provided chickens for supper, and Charles slept on a pallet in one of the priest’s hiding holes in the house instead of in the oak. The brothers watched the roads day and night, the circumspect and cautious Richard, of Hobbal Grange, omitting no precautions which might ensure the safety of his charge. On Sunday Colonel Carlis and the faithful William stole a sheep. Charles had mentioned overnight his strong desire for

mutton, and the colonel, having racked his brains how to obtain it, had gone with William to Mr. Staunton's sheep-cote. Here he, the colonel, selects a sheep, sticks it with his dagger, and leaves Will to bring it home on his back. There was no other way of obtaining mutton safely. It might have been procured at market at that period of the year. The battle of Worcester was fought on September 3, when sheep were fat in the pastures; but the Penderels never purchased mutton, being people of economy, and their doing so now might have attracted notice. So the sheep was stolen. Early in the morning Charles said his prayers, and then stood afterwards some time watching the road which passes Boscobel from Tong to Brewood. He then came downstairs and broiled some chops for breakfast.

During Sunday all the brothers except Richard stationed themselves around the house, as scouts. Richard went to Moseley to meet Lord Wilmot, and the king passed the day in the arbour in the garden, which same arbour still remains.

On the following morning the escape from Boscobel was effected in safety; the king departed on the back of an old mare, taken up from grass for the occasion, seated on an ancient saddle and holding the reins of a worn-out bridle. Walking would have been an easier method of progression, but for his sore feet. The faithful brothers and Francis Yates formed his body guard, marching alongside the old mare with bills, and pikes, and pistols. "Remember, please your Majesty," said the miller on the road, when Charles complained that of all the horses he had ever mounted this was the dullest. "Remember the poor horse has the weight of three kingdoms on her back." At Penford Mill a footpath was preferred as safer and nearer than the road, and George and William and Humphrey, with his mare, returned home. For a moment, at parting, the king forgot his guides and was moving away, when he turned back, gave them his hand, stained with walnut leaves, to kiss, and said, "I thank you all; my troubles had made me forgetful."

At break of day on Monday (September 8), Charles was safely secreted by his friend, the future Rochester. He afterwards passed on to Bristol, and then through Somerset, Wilts, and Hants to Brighton, where he embarked at the end of October.

Doubts have been expressed whether the existing oak at Boscobel is the original Royal Oak or its successor. It is a tree of 12 ft. 3 in. in girth at four feet from the ground, and it certainly has the appearance of a tree 400 or 450 years old. The best evidence on the subject is that of Lord Bradford, who has known the tree during half a century—while his family have known it several generations—and says that it looks now much as it did 50 years ago. On the other hand, another witness says that he measured the tree in 1857, and

again 21 years later, and found that its girth had increased 11 inches, or half an inch annually. He thinks, therefore, that the tree must have been a sapling 227 years previously, when the king is supposed to have hidden in it. Old trees, however, often increase in the circumference of their trunks, during a process of internal decay and filling up with young wood. The Cressage Oak offers an example of this senile expansion, at the age probably of 1,500 years; so do many of the ancient oaks in Bagot Park, Staffordshire.

The Royal Oak appears to the writer to be an aged tree. It grows on a gravel soil, better suited to the elm than oak, and its growth, even in its prime, must have been slow.

H. E.

—:O:—

FORMATION OF OSIER BEDS.

"**N** IHI TEMERE" omits that most important point of information which is necessary to give sound information on planting hardwooded subjects of any kind, and therefore only qualified directions can be given. If near a town where large quantities of osiers or "rods" (to use a technical term) are used, a well-managed plantation is a profitable affair, if on suitable soil, as rods fetch from 3s. to 5s. per bolt, and white or peeled rods of good quality will fetch from 9s. to 11s. per bolt. In growing this crop the ground should be trenched to the depth of a foot or eighteen inches, of course paying due attention to the quality of the subsoil. Seeds of about fifteen inches long should be inserted in rows about a foot and a half apart in the rows, and two feet from row to row, where they are needed for a covert, and must be kept well hoed and free from weeds. The first year they should be cut over, and a small crop will be had, but the next and succeeding years good crops will be produced if the beds are kept clean. There is no necessity to dig or break up a bed for twenty years if the soil is kept clean, and the stools properly cut over not later than February. Some beds can be kept for hoop making, in which case they would make four or five years' growth between each cutting, and if the plantation was divided into plots about two chains wide and five long, capital fox lays would be formed, and if alleys about ten feet wide were left between the beds, little damage would be done to the rods while working the dogs. As, however, practical demonstration in these matters teaches more than volumes of written instructions, I would suggest that if "Nihil Temere," or any of the gentlemen in his hunt are in London during January, Mr. R. Wheatley, of Walton-on-Thames, Surrey (L. and S. W. Main Line), will have great pleasure in showing them his beds on the Thames, where good crops and good work show what can be grown in the way of osiers, rods of from ten to twelve feet long of 1881 growth being the rule. Of course it would be necessary to write, making an appointment if a visit is paid, but nothing in the way of fox preserving will be found there. If "Nihil Temere" wills taste what soil the proposed beds are to be on, and whether the climate is hot or cold, I shall have pleasure in describing a course of culture that would be successful, because I cannot see why with the hundreds of acres of land that could be worked for osiers, we should purchase such large quantities from foreign countries.—WALTER J. MAY, in the *Field*.

*THE USE OF CARBOLIC ACID IN FORESTRY.**

CARBOLIC acid being antiseptic, is used for preserving timber; but it is to another of its uses that attention is here called.

Carbolic acid affords to plants a most effective protection from their enemies. Gardeners have discovered that seeds (peas, beans, maize, &c.), which before putting into the ground have been kept rather less than twenty-four hours in a weak mixture of carbolic acid and water, will not be meddled with by worms, mice, moles, or other enemies.

The seeds themselves are said to receive no injury from this treatment. A tree painted with the same weak mixture will not be approached by rabbits. This also has been proved by experiment.

In houses rats, mice, and vermin may be driven away by the smell of carbolic acid.

The idea suggests itself that in forest economy also this little-noted property of carbolic acid should be utilized. There is no reason why tree seeds should not likewise be treated with weak acid to protect them against the attacks of mice and birds; at worst no diminution of germinative power would be caused by this process.

To prevent birds feeding on tree seeds, experiments have recently been made with red minium, and the seeds before being sown were coloured with this substance.

This remedy, however, seems to have had doubtful success, as can be gathered from *Danckelmann's Zeitschrift fuer Forst und Jagdwesen*, (pp. 455 and 576 of the 1880 set), although a more recent writer (p. 637) tells of favourable results.

At all events, to steep seeds in weak carbolic acid is simpler than to colour them with vermilion, and the expense can be no hindrance, seeing that crude carbolic acid can be obtained either from the chemist or grocer at a cheap rate.

For these reasons this remedy is recommended to the members of the forester's profession to be employed experimentally.

Perhaps also nursery plants and valuable young trees might be protected from the destructive bites of hares and roe deer, if from time to time the plants were watered.

* Translated from the *Forst und Jagd Zeitung*.

THE HOME FARM IN MARCH.

THE *Arable Lands* will now tax the energies of the farmer. Get in spring *wheats, oats, peas, beans, and parsnips* early in the month, and *white Belgian* and *intermediate carrots* towards the end. Cross-ploughing for potatoes, mangolds, and any other spring crops, may also be done in dry weather. The main crop of *potatoes* should be in the ground during March. Also get in *barley*, for which a light ploughing is best, especially where roots have been fed off. Clean land is a requisite. As a rule no ploughing of light lands for root crops should be done after the present month. Continue to sow *winter tares* for folding off or cutting in the summer. Seed-beds of cabbage, kale, and kohl rabi may now be sown for transplanting. Upon chalky soils drill in *sainfoin*.

Live Stock.—The work of the horses being now heavy, they should be liberally fed. Carrots will be of great service to them. Lessen the work of mares in foal. The store of mangolds may now be commenced both for cattle and sheep. The pigs will benefit by them much more later on. Continue a liberal supply of dry food to the ewe flock, and to fattening sheep upon turnips.

Hops being already manured and ploughed or dug, should be cut or dressed during March. Burn up the old bines at once. Work out and remove surface runners. Select cuttings or stub-sets from the strongest hills.

Pasture Lands intended to be mown should now be clear of stock and have received a good dragging and rolling. Top-dress poor pastures with rotten dung, fine bones, Peruvian guano, or superphosphate of lime and nitrate of soda.

Dairy management.—Liberally feed milch cows with cut chaff, carrots or other roots, grains, and sweet hay or straw. Also give them access to pure water. A good admixture of pulped roots will make even inferior hay and straw palatable, and if allowed to lie in the heap for about twenty-four hours, a slight fermentation will improve it. Some malt-dust or decorticated cotton cake will greatly add to the milk-producing properties of the mixture.

Poultry warmly housed and liberally fed may now be expected to lay well, especially where Dorkings or a cross are kept. Give young chickens hard-boiled eggs finely chopped, potatoes and middlings, hemp seed, and tail wheat. Give young turkeys crumbled bread and eggs, curds, and some young onions finely chopped. Geese should have warm boxes to sit in, with free access to water.

Estate Work.—Cart manures to garden and nursery, young trees to the planters, fencing and road materials, gravel for carriage-roads, and drag and roll lawns and parks. Also clear falls of timber and fill up the timber-yard and the wood-sheds, and lay in household faggots and brush for home use, as well as for lime-burning and other purposes.

A. J. B.

TREES AT WARWICK CASTLE.

A WRITER in the *Garden*, describing the beauties of this old castle, says:—"The surroundings impress one with their simple grandeur and repose, created exclusively by an undulated and well-diversified surface, noble tree growth, and broad sweeps of lawn. One of the choicest examples of garden landscape scenery is the view extending from the old orangery down to the river. The surface is a gentle slope to the water's edge, bounded on either side by luxuriant tree growth in great variety and with varying tones, from the sombre hue of the yew to the pale green of the deciduous cypress, the whole representing a scene of rich sylvan beauty enhanced by the view of the Avon, beyond here greatly widened. The first impression is that it is a lake, but on walking through the vista it is seen that the trees have been planted so as to obscure the bends of the river. The principal types are the oak, horse and sweet chestnut, the plane, and false acacia, all of which are represented by prodigious specimens, and of conifers there are the cedar, larch, Scotch fir, and yew. The manner in which the noble tree growth is disposed about the dressed part of the grounds is worthy of notice. The finest examples, both of cedars, oaks, and

other deciduous trees, stand out boldly by themselves from the greensward, and tell, as it were, their own tale unmingled in confused groups, as is too often seen in the modern style of planting. Trees such as the silver maple may be seen in all their graceful beauty unencumbered by other trees or shrubs, and so with many other trees that drop their boughs naturally, while in contrast with these huge naked boles of the larch, Scotch fir, acacia, and elm may be seen everywhere in groups of half a dozen or so rising directly from the greensward, thus displaying their characteristic growth to advantage. The venerable cedars of Lebanon that are to be met with in every part of the grounds are the glory of Warwick; than some of these, no finer specimens exist in the country. The largest are on the river under the castle walls; one in particular a veritable forest in itself, having huge limbs of immense girth spreading out in all directions. The trees are not all of an age; there are many of younger growth growing on to take the place of the larger trees. It is a matter of regret that young cedars of Lebanon are not more planted than they are instead of the numbers of other less-trying conifers."



ENGLAND.

ANOTHER month's continued fine weather should have enabled even the most backward to fetch up all arrears of woodland work. Where planting is finished and thinning well advanced, every attention should be paid to clearance roads, so as to enable purchasers to carry out without hindrance and without any excuses for delay. But where any plants of large size have still to be removed, the oft-recommended careful covering of the roots, or puddling in dry weather, should never be lost sight of.

Thinnings should in all cases be regulated by situation and exposure, as well as by the previous treatment of the trees. Almost as much damage is done by a too sudden and reckless clearance as by overcrowding. Larch, in particular, should never be suddenly exposed after the buds begin to break.

During the present month all coppice falling should be completed and the produce cleared from off the stubs. Backing out to clearance roads should be enforced, wherever this is possible. An early growth from the stool may be expected with a continuance of the present mild weather; hence the necessity for early clearance.

The marking of oak may proceed at once, and wherever these are selected from close plantations the good of the standing trees rather than the value of the fall should be the principal consideration.

Nursery work will include the manuring and digging of plots, whether for alternating green crops or for seedling transplanting, and also the preparations of seed-beds. The rot-heaps will require to be opened, and the seeds to be sown at once. Keep off the land in wet weather, as wherever the soil becomes poached under the foot it makes an unkindly seed-bed. Always sow in rows or drills, as this gives greater facilities for cleaning as well as for undercutting, if the plants are intended to remain long without transplanting. But for mutual protection broadcast sowing is to be preferred, as the young plants thus shelter each other.

Ash keys from the rot-heap, one-half of the elm seeds, beechmast, the maple and sycamore, holly and alder seeds, and also birch, may at once be sown. For small seeds the soil should be reduced to as fine a tilth as can possibly be obtained, and the layer of soil above the seed should be proportioned to the size of the seed itself. When deeply buried, that portion of the stem between the germinated seed and the surface of the soil is particularly liable to the attacks of insects. The selection of seeds from robust trees, and in the prime of life, is a matter of primary importance. The strength of the plants will depend very much upon this. Prepare seed-beds for fir and pine seeds to be sown next month.

Layering may be proceeded with, though many prefer the early autumn for this work. Also cut off and plant out old layers which have taken good hold of the soil. And the grafting upon oak, birch, and elm may be commenced.

During the present month every preparation should be made for the bark-stripping, which may commence soon after the middle of April. Where drying-stages are made use of, materials for the erection of these should be in readiness. Here we are seldom later than the 19th of April in making a start.

Hedges and fences of all kinds will now require especial attention, so as to have the plantations and woods secure from the browsing of sheep and cattle as the young shoots start into growth. Where the fall is completed the hedges may at once be laid or plashed; and if the work is well done and the whole backed up by a good ditch, but little mending up will be required until the time of the next fall.

Pluckley, Kent.

A. J. BURROWS.

SCOTLAND.

WITH the exception of a few days about the middle of last month, when we had a considerable fall of snow, which, however, quickly disappeared, the weather has all along been favourable for general forest work.

Planting, where not yet completed, should be finished as early as possible.

The transplanting of all deciduous trees, whether in the nursery or in the formation of plantations, should at once be overtaken. Fill up all failures in plantations formed during the last two seasons, and cut over near the ground all deciduous trees which may have died

back. Owing to the stormy character of the weather during the winter months, many of the larger autumn planted trees must have been considerably knocked about; these should be all gone over, and made firm in an upright position.

The thinning of plantations, particularly those that are somewhat crowded, should be at once completed, and that of all plantations as early as possible, before the end of the month. The cutting of hedgerow and other timber, should also be completed early. Remove as far as possible timber from the woodlands, particularly from those portions where the stools are intended for reproduction, so that there may be no disturbance there after the shoots begin to come away.

In the nursery dig over all plots as they become vacant, top-dressing those somewhat exhausted and which are to be re-cropped with plants. Those intended for green crop should receive a liberal supply of well rotted dung, either when digging over or when laying down the crop. All plants intended for transplanting, whether in the woodlands or in the nursery, should now be raised up, or lifted and thinly "sheughed" in till required. Seedlings should now be selected and removed to the home nursery, and those of an early growth inserted in the lines as soon as possible. Guard against exposing the roots for any length of time if the weather is dry. Dig over and well pulverize all ground intended for seed beds. All seeds not already in the ground should be sown during the month, except those of the pines.

Continue the cleaning of shrubberies and the pruning and dressing of evergreens as before recommended.

Continue groundwork improvements. This is a good time for the draining of arable lands; wet parts are more easily detected, and the work should be accomplished so as not to interfere with the cropping or pasturing of the lands.

Darnaway, N.B.

D. SCOTT.

IRELAND.

PLANTING forest trees may still be carried on, but the work ought now to be finished with as little delay as possible. The present extremely mild season renders the winding up of planting all the more urgent. Hardwood and deciduous varieties ought to be got in first, evergreens may be delayed until the last. In removing plants great care should be taken to prevent the roots getting dry with the March wind, this being a source of great injury to the vitality of the plant.

The planting of hedges should also be finished early in the month. All gaps in live fences should be repaired, and fences receive a general look over.

Continue cutting undergrowth, removing the material as cut, so as not to injure the coming young growth.

Prune coppice wood during the month, but finish if possible before the end of March.

Sow thorn, beech, ash, sycamore, holly, and similar seeds in prepared beds, covering the seed with about an inch of fine earth.

Plant coniferæ seedlings in the nursery during fine weather. Dry weather for this kind of work as it prevents the growth of weeds, and keeps the earth from getting hard about the plants.

Ballinacourte, Tipperary.

D. SYM SCOTT.

WALES.

PLANTING operations should now be brought to a close as early as possible; and from the mildness of the season, little should now require to be done. Ground of a damp or mossy nature that has been left over should now be planted. It is at all times most essential to keep the roots of plants exposed for as short a time as possible, and it is especially so at this season of the year, when the winds are keen and drying. Fill up all vacancies in plantations where plants of previous plantings have failed. Where young hardwood trees have been destroyed by ground game, or have died back from other causes, they should be cut over at the surface of the ground, when they may make fresh shoots.

The thinning of hardwood trees should also be finished as early as possible this month, although young fir plantations may be thinned with advantage for some time. Continue to clear up cordwood, and bind faggots, which should be stacked in a dry state, as time and circumstances permit.

Where plants in the nursery have made good growth last season, fibrous root growth will be much encouraged and improved by digging between the rows. Ground from which plants have been removed should be turned up in preparation for a green crop. Ground so treated, and well cleaned last year, should now be filled up with young plants.

LEWIS BAYNE.

Kinmel Park.



SUCH a favourable winter for the operations of the forester as the one we have just passed through, has probably not been experienced by any one alive. Planting and transplanting have been conducted under the most favourable conditions, and the success attending these operations ought to reach the maximum this year. Even under the serious depression from which the landed interest has been suffering during the past few years, the formation of plantations has been carried on with considerable spirit, and the area of woodlands on well-managed estates is showing a decided increase, which is making itself more and more evident every season. On many properties which are managed with energy and forethought, planting has been done on a greatly increased scale during recent years, and especially during the past season. The owners of such properties are acting wisely in thus taking advantage of the favourable season and no less favourable circumstances, for making a permanent addition to the value of the land, and at the same time providing a secure and certain source of income, which is safe to increase from year to year, and which no foreign competition is ever likely to seriously affect.

* *

We are glad to hear that at the February meeting of the Edinburgh Botanical Society, it was announced that the measurements of trees growing in the Botanic Gardens and Arboretum, which have been so carefully taken and noted for some time

by the late Sir Robert Christison, are to be continued by Mr. Sadler. It is only by comparing the growths of different trees of the same species, and of different species, for a long series of years, that any useful deductions can be formed, and it must be an object of interest to all arborists that the work so well begun by Sir Robert Christison is to be carried on and recorded under the auspices of the Edinburgh Society. The work could not be in better hands than those of the able Curator of the Botanic Garden and Arboretum; and we look to it as a small beginning of the many advantages which are promised to arboriculturists when the Arboretum assumes its primary educational functions.

* *

We learn that Col. G. F. Pearson will read a paper on March 1 before the Society of Arts on "The Teaching of Forestry," a subject which his intimate connection with the Forest School of Nancy, France, enables him to deal with in the most thorough manner. We hope to be able to present our readers next month with a *resumé* of the Colonel's paper.

* *

The remarkably mild winter has brought a host of trees and shrubs into flower, with a profusion and brilliancy that is too rarely seen at this early season. This is particularly the case with the early-flowering section of *Rhododendrons*. Since the early days of winter *Rhododendron Dauricum* and its dark variety, *atrovirens*, have displayed their purple blossoms amid

several degrees of frost; and from nearly as early a date the varieties of *R. Nobleanum* could be seen expanding their gorgeous scarlet flowers, almost casting into shade the brilliancy of the winter sun! The free-flowering "Cunningham's White" rhododendron has seldom been seen in such splendid flower; and numerous other beautiful varieties are exhibiting their charming tints in the most profuse and attractive fashion, which, let us hope, no lingering blast of winter will yet destroy. The gem of all rhododendrons this season, however, has been the dwarf compact-growing *R. praeox*, and especially the profuse flowering variety, "Early Gem." These have been perfect nosegays of purple bloom, and should be freely planted in all pleasure-grounds where early and attractive flowers are a desideratum. All this lovely class of early-flowering rhododendrons deserve a suitable position in the grounds around every country mansion, even although it be only once in a decade that they are seen in such brilliant flower as they display this season.

* *

The timber supply in the United States, and the conservancy of the forests from which it is drawn, is receiving a considerable share of attention from the Government, and various reports and statistics have appeared of late bearing upon the nature and extent of the forests; the quantity of timber they can supply; the various demands for it; and the best modes of preserving and working the natural forests, as well as creating others where wanted for the necessities of the country. Among other able men, Professor C. S. Sargent has taken a leading part in compiling these reports for the Government, and disseminating a knowledge of trees and the principles of forestry among the people. One of his latest endeavours in the cause of forestry is the issue of a series of

illustrated bulletins on the extent and condition of the Pine Woods in the States of Texas, Florida, Alabama, Mississippi, and Minnesota, with an estimate of the amount of merchantable pine standing in them on May 31, 1880. From the figures given of the quantity of pine still standing, and the large extent of ground covered by forests in these five States, as shown on the excellent sketch maps accompanying each bulletin, there appears to be a considerable unworked area of natural forest which might easily be converted by proper management into valuable State forests; giving a regular and permanent supply of the best timber for the wants of the country. It seems evident that the United States has still abundance of forest lands in the hands of the Government to make them for ever independent of a supply from other countries, if they are at once put under a proper system of forest conservancy, so as to insure and continue their productiveness.

* *

The pine forest area in Texas, as shown by Professor Sargent, is confined to the eastern portion of the State, stretching along the western bank of the Sabine river from about 30° N. latitude to the Red River in about 34° N. latitude. A comparatively small portion of this has been cut, chiefly along the course of the rivers. The pines consist of the Loblolly (*Pinus taeda*), Yellow or short leaved (*P. mitis*), and the Southern or long leaved (*P. Australis*). The greater part of the pine woods of Florida consist of *P. Australis*, with a belt of "pitch-pine" (*P. Cubensis* [?]) stretching along the coasts. In Alabama the prevailing pine is also *P. Australis*, with less areas of *P. mitis*. The same species stretch westward into Mississippi, and there form very extensive pine woods. These "Pine Barrens," as they are termed in the States, cover many millions of acres in Florida, Alabama, and Mississippi,

and only a very small part of them, along the course of rivers and railroads, have yet been cut. Minnesota furnishes a greater variety of timber trees; pines and hardwoods covering about equal areas. A large portion of the whole has been already cut and destroyed, but there is still a considerable extent of pine standing in the northern part of the State, and along the shore of Lake Superior. A Forest Board is urgently required to manage the working of these forests, which threaten to utterly disappear before the axe of the lumberman in a very short period, if the annual cut is not regulated, and the regeneration of the forests conducted according to a proper and systematic plan.

* *

Of the few evergreen shrubs which flower profusely in such seasons as this all through the winter and spring, the Laurestine (*Viburnum tinus*) is one of the most beautiful. A native of the South of Europe, it is liable to be cut down in severe winters, but generally springs from the stool again with great vigour. In moderate seasons it produces an abundance of its lovely white flowers from November till May. On dry soil, in a sheltered place, it will give satisfaction in most seasons, and it well deserves a little extra care in the selection of the site and soil. A very desirable companion to the Laurestine, is the deciduous Mezereum (*Daphne Mezereum*), which produces a profusion of its rich purplish-red fragrant blossoms at the same season, and forms a fine contrast with a background of Laurestine. The Mezereum is a native of the South and West of England, and endures most of our winters with impunity, although such winters as 1880-1 injured it and many other indigenous plants. Planters should freely introduce both these attractive, though old-fashioned shrubs in

the foreground of clumps and shrubberies in ornamental grounds.

* *

One of the most charming flowering shrubs of the season is the *Andromeda floribunda*. Its lovely white spikes of heath-like blossoms are thrown well above the evergreen foliage, and form an attractive object in the front of a shrubbery in the early spring months. It is of dwarf and compact growth, and will suit for any corner where a few square feet can be spared. It is slow to propagate, and consequently rather costly; but when once established it is very accommodating, and will stand uninjured through ordinary winters.

* *

We are pleased to notice that the attention of Parliament is about to be called to the production of the Crown forests. Sir John Lubbock gave notice recently, that on the 7th of March, he should move, in the House of Commons, for a select committee to inquire into the state of the Crown forests and woodlands, and whether any, and if so, what steps can be taken to render them reproductive.

* *

We are glad to see that Messrs. Veitch and Sons, of Chelsea, have greatly added to the value of their useful "Manual of the Coniferae," reviewed in these pages in July last, by issuing an excellent index of the scientific names of the conifers described in the body of the work, and of the numerous beautiful illustrations. So far as this goes it is a valuable addition to a most useful book; and Messrs. Veitch will confer an additional favour on practical men, if at some future time they can add as full and complete an index of the "popular names" of conifers to be placed alongside the present one. We may add that Messrs. Veitch with their usual liberality, are distributing

the new index *gratis* to all who possess a copy of the "Manual" into which it fits neatly. -

* *

We have again before us Miss Ormerod's Annual "Report of Observations of Injurious Insects," which is undoubtedly one of the most valuable works upon any branch of science affecting our rural industries which has appeared for a length of time. The present issue contains upwards of a hundred pages, including an exhaustive Special Report on the Turnip Fly, which should be read and carefully studied by every agriculturist in the country. It is not our purpose to enter into details of Miss Ormerod's valuable records and instructive suggestions, as they can be best understood by a perusal of the Report; but as an instance of the terrible loss sustained by the country from the ravages of a particular insect in one season, we may state that the loss suffered from Turnip Fly last year, in thirty-three counties in England and Scotland, is estimated by Miss Ormerod, from carefully compiled returns, to be no less than £671,936. This enormous sum is probably much less than the real amount of loss, which in the whole of the United Kingdom would represent something approaching a million of money. Add to this the loss sustained by all our other food crops and forest trees from insect ravages, and the total sum will show the vast importance of paying a closer attention to the subject than we are in the habit of doing. The Report is published by Messrs. Sonnenschein and Co., Paternoster Row, London, at the low price of eighteenpence.

* *

Of insect attack on forest trees during 1881, Miss Ormerod's Report mentions severe attacks of the Oak Leaf-roller Moth (*Tortrix viridana*) in the neighbourhood of London; near Stormontfield, Perth; and at Tullamore, King's County. Oak

Galls of several kinds appear to have been rather numerous in some parts; but Miss Ormerod considers that "probably the 'Marble' and 'Common Spangle' Galls are the only kinds that are hurtful to any serious extent." The Pine Beetle (*Hylurgus piniperda*) is recorded as being very destructive at Tullamore, King's County; near Forres; and at Stormontfield. The Pine Saw-fly was very numerous at Panmure, Forfarshire, where it badly attacked *Pinus Austriaca* and *P. laricio*, as well as Scots Fir. It is also noted as having appeared in great numbers in Scots Fir plantations at Darnaway, Forres; Tullamore, King's County; Elsing, Norfolk; and Ogbourne Maizey, Marlborough. The Pine Weevil (*Hyllobius abietis*) is only reported on by Mr. Wilkie, of Ardkinglas, near Inverary, who records the remarkable power of the insect to endure severe frost. From Marchmont, Berwickshire, Mr. Loney reports "great harm to the leafage of Beeches," by the attack of a small beetle, *Orchestes fagi*, or "Beech Weevil," from which they did not recover during the summer. The Elm-leaf Maggots (*Orchestes scutellaris*, and *O. Alni*) are reported in the middle of June, by Mr. Ballingal, of Islay, N.B., as threatening to do much damage to elm leaves. We should think that many foresters in the country could add considerably to the above summary of insect damage to trees, and we trust that each will resolve to do their best to help Miss Ormerod in her laudable task during the present season, by forwarding insects as they meet with them, and a note of the damage done.

* *

At the last meeting of the National Education Association of the United States, an instructive address was delivered on "Our Schools and our Forests," by Dr. Franklin B. Hough, Chief of the Forestry Division, U.S., Department of Agriculture. After referring to the well-

known facts of the rapid disappearance of American forests, and the great influence which woodlands have upon the climate and the prosperity of a country, he draws attention to the great interest now being taken in all civilized countries in the preservation and management of their forests, and points out that in most of them are to be found well-equipped Forest Schools for the careful training of young men in the art and science of forestry. In well-timed language Dr. Hough ably shows how a useful knowledge of forestry may be imparted to the general public, through the means of our schools and colleges, if the facilities they already possess are applied to the subject. A knowledge of useful trees and shrubs, and the purposes for which they are best suited, can be imparted in any school; but the important part—their cultivation and management—must of necessity be crude and rudimentary under such circumstance; still, the benefits derived from such elementary teaching will more than warrant its general adoption, especially in a country like the United States, where the land is parceled out among a multitude of small proprietors, none of whom can afford to employ a professional forester.

* *

The second fascicle has reached us of the "Principles of Forest Organization," by Professor Broliard, of the French Forest School, Nancy, translated by Mr. Fernandez, of the Indian Forest Department. The work of translation is carefully done, and the numerous notes by the translator explain to the English reader the various French terms and obscure passages in such a manner as to render them clear and intelligible. The present part treats of the various methods of working high forests, as taught in the French Forest School; and much useful information may be gathered from it by foresters in every part of the

world. When the translation is completed, the book will form a valuable assistant to the student of forestry, in pointing out to him the methods by which the French have attained their celebrity as teachers of forestry, and the maxims they inculcate for the successful management of forests.

* *

We are glad to observe from the Annual Report, 1881, that the Royal Botanic Institution of Glasgow, has made great progress during the past years in its efforts to remodel the gardens, and to put the institution on a basis equal to the wants of the day. With this in view, the Directors have bought the interest in the Kibble Palace, and converted it into a Winter Garden for the accommodation of trees and shrubs, from temperate climes, but which are unable to endure the rigours of our winter.

* *

A new range of glass houses, and many other useful improvements are contemplated, which when completed will make the Garden equal to any of the kind for the purposes of public instruction.

* *

The remarkable success which has attended the efforts of the French in the *reboisement* of the torrent regions of the Hautes and Basses Alpes, has drawn the attention of other countries, where similar causes prevail, to the methods followed in stemming the torrents and clothing the mountain sides with thriving forests. An interesting account of a visit to the works on the Hautes and Basses Alpes, and on Mount Faron, near Toulon, has recently been written by Mr. Moir, of the Indian Forest Service. Those interested in the subject will find much instructive reading in Mr. Moir's excellently written report, which is accompanied by several capital illustrations of the work performed, and of various details in connection therewith.



TREE PRUNING.

SIR,—On perusing the translation of A. des Cars' work on "Tree Pruning," which has lately appeared in the *Journal*, I find that near top of page 711, he recommends *nailing* a piece of oak board into cavities in the trunks of trees as a means of assisting nature to heal these over. He even goes further, and recommends the *nailing of a piece of zinc or other metal over that*. I presume that few in this country will have seen such an experiment tried, but it may be successful in facilitating the formation of new timber over such wounds. If applied only to assist in the preservation of old or remarkable trees, where the main object in view is their conservation, such an application may do well enough, but to treat trees in this manner when they are grown principally for timber purposes, seems to savour strongly of the ridiculous.

Granting that such a cure was applied to any tree which was cultivated with the latter end in view, and that in process of time all marks of the wound, plate &c., were obliterated, where is the timber merchant, who, knowing *that*, would be found willing to give anything like the full value for the timber of that tree if he had no other purpose for it than the usual one of sawing it up?

Further, if there were only a few trees that had been so treated growing amongst a large number which were for sale, and *that fact* became known to intending purchasers, it would in all probability entail a much greater loss to the disposer than if the trees which had needed and received such treatment had been hewn down and

cast into the fire. Any person who has observed trees sawn up which contained nails or iron of any kind, must frequently have seen more injury done to the saws by that means than the whole commercial value of the tree itself. When wounds, which require *nailing* treatment, appear upon trees that are cultivated for profit, the best system of pruning with which I am acquainted is to treat them as if matured, and prune them off by the root. It is very questionable whether unskilful cutting in the pruning of trees, or the driving of nails into their stems, would in the ultimate issue be the more injurious in a pecuniary point of view; and unless those that apply the former be too severe in their treatment, they that apply the latter, although only occasionally, may probably do the greater damage of the two.

RUSTIC.

THE SALE OF WOOD.

SIR,—Your correspondent "Erin" in last month's *Journal* brings a very important branch of forest management under notice, viz., selling of timber. With the country deluged with blown-down trees at present, it becomes a very serious matter for those who may not be in a position to know the best market. There is no doubt the safest and most practical way would be to defer cutting and clearing except what is absolutely necessary at present. I do not know if the proprietors of the *Journal of Forestry* contemplate publishing a *Forest Annual* and *Address Book*, but if such were accomplished, it would

be a very important achievement. The *Journal* has already done good work by publishing the annual returns of prices of forest produce; and if a list of the best markets, and wood merchants, were added, it would afford a means of communication between buyer and seller. Hoping that the subject will be practically dealt with in the pages of the *Journal*,

I am, &c.,

Feb. 9, 1882. "TANGO."

[Our correspondent would find much of the information he requires by consulting the *Timber Trades Journal*, published weekly at 14, Bartholomew Close, E.C.—ED.]

FOREST FIRES, AND HOW TO PREVENT THEM.

SIR,—Some time ago a line of railway was cut through some hill pasture of mine, and in order to relieve the monotonous heathery appearance of the place, I planted some small plantations of trees along the side of the line, consisting of conifers and hardwood. Some of my friends told me I committed a great mistake in not leaving a margin of at least 50 yards between the railway and my young trees, where I was assured the heather would always have to be kept low, by either pulling or cutting; "because," said they, "sparks from passing engines in dry weather are sure to set all your young trees on fire;" but, as yet, my young trees are growing very well, just as they were planted, and so is the heather around them; and, with the exception of a few yards burnt last spring by an engine spark, no fire has yet appeared near them. Will you or some of your numerous correspondents be so kind as to say whether or not I should yet root up my plants, and shift them back, say 50 yards, and also pull or cut the heather as a precaution against fire?

Along a much-frequented highway I have a conifer and hardwood plantation, the trees, varying from 15 ft. to 40 ft. high, and the ground possessing an excellent game cover of underwood, whins, and longish heather. A neighbouring proprietor had some of a similar plantation, and along a similar road, burnt last spring, by a pipe-light being carelessly thrown away, as it was supposed, and I have been advised to cut away all my underwood and whins, thus destroying my game cover; and also to cut all the trees in a breadth of 30 ft. at 100 yards from this road, so as to form a pass running parallel with the road; then, not only cut away the underwood and whin, but pull up all the heather and moss also, so that if a fire should take place at the road-side, this pass or avenue might form an effectual barrier to stop the fire from extending inwards beyond the 100 yards in breadth. Is this the cheapest and wisest way of guarding against fire?

J. HEATHER.

PROTECTING TREES FROM RABBITS.

SIR,—At page 738 of your last issue, Mr. McCorquodale seems to think that the protecting of trees by larch bark, from the ravages of rabbits, must be a serious matter, judging from the various obstacles he sees in the way of using it for such a purpose.

I can assure him, or any one else who may choose to give it a fair trial, that they will find it one of the best and cheapest modes of protecting many varieties of plants.

I don't for one moment mean to say that it is the best protector in all cases. There are plants for which I would prefer wire netting, until the plants were strong enough, say from three to four inches diameter in the stem.

The bark of several trees will suit

for such protections, such as oak, when clean and easily taken off, elm, poplar, willow, but none of them equal to larch, as none of them will peel so well into suitable lengths.

In using bark for tree protection, it does not need to be dried and stored as far tanning purposes, but used immediately when taken off the tree; but it can be kept in store in any shed, or loft, or ricked up in any shady place in the woods until ready for use, and instead of carting it miles to a boiler, it is far easier to get a second-hand boiler and cart it to where the bark is to be used; the boiler can easily be fitted up roughly with some stones around it, and a good fire of brushwood put under it, will soon get up steam.

As Mr. McCorquodale wishes to be as economical as possible, he does not at all require to purchase Archangel tar, for the first sixteen years at any rate, as I know they will last that time without it.

In placing the bark around the tree it is the best plan to sink the end a few inches into the ground, as it will be more secure; but it will suit well enough to be pushed close to the ground, care being taken that the rabbits don't burrow under and bark the plants.

The price of larch bark cannot be high at the present time, when oak bark is selling for £3 5s. per ton. In most cases larch is never peeled at all, but cut down for estate and other purposes, and used or disposed of with the bark upon it. Viewing the matter in this light, one cannot set a very high value upon it, and considering what a great quantity could be got from a ton weight, suitable for tree protection, and at a small cost for labour, as it is not very difficult to peel larch, it is much cheaper than wire netting, as the same cost for labour will fix the bark in its place as would be expended on fixing wire netting guards, which have to be *bought*, as they don't grow in the woods.

Paint also costs lots of money, whether it be grass colour, green, or sky blue.

Many compositions are made to prevent hares and rabbits from barking young trees; Davidson's, of Leith, for instance, will stick on oaks and hollies for as much as eight years or more. I have no doubt but Mr. McCorquodale is quite familiar with every variety that has been used, but as every forester has not the same facility for experimenting with coal-tar as he has, most of us will hail with delight the day when he gets it into such consistency as it can be applied by a proper brush, as most of us detest the woollen and cotton cloths for its application.

By the way, the stems of plants smeared over with pitch-tar look black and unnatural; a better colour can be obtained by mixing coal-tar water with the lime taken from the gas purifiers, and this mixture can be easily applied with a brush. If the colour should be thought too light for the eye, a little soot can be added, which gives it a darker tinge; this is a safe and effectual protection for years. This system was largely and safely tried on many varieties of plants as long ago as 1853.

I quite agree with Mr. McCorquodale, that the most effectual remedy for the rabbit plague is to have them all killed, but most proprietors like to have a few hares and rabbits on their properties, so the foresters must just do their best to protect the plants as well as they can.

I should have mentioned that in mixing coal-tar water with the lime I never used the lime until a month or so after it had been taken from the purifiers, so as to allow the gaseous vapour full time to escape.

Pure coal-tar is not safe to use upon plants of a tender age, it has a most injurious effect upon many varieties.

Coal-tar water has been used as a stimulant and fertiliser for young

plants with great success when carefully applied. Say, to one gallon of tar-water add three gallons of pure water, then scoop out the soil in a circle round the plant, and pour in the water without touching the branches.

The same composition makes an excellent top dressing for grass that has become moss-grown; a few applications of this put on in showery weather soon kills the moss.

If Mr. McCorquodale, or any of your numerous readers, have tried the watering of young pines with the tar-water, I shall be glad to hear what success they met with? and to have the benefit of their experience and opinion on the matter.

ARCH. HENDERSON.

*Tullamore, King's County,
Ireland.*

SIR,—It appears we have years ago been tarring our fences with tar heated and applied much in the same way Mr. Baxter now does his, but finding it both cumbrous and expensive, I began looking about for an easier and cheaper way, and found that the same thick tar which we thinned by heating, could be as suitably thinned by a mixture of common paraffin, much the same as paint is thinned when mixed with oil and turpentine. This mixture we applied to the iron fences with a rag in the bare hand. Although this was a great improvement on the old way, and that in every sense of the term, we found that it would be a saving if we could have a cheaper and thinner tar boiled down at our tool-yard to a suitable consistency, and equally suitable for trees or fences, and this led us to preparing tar as described in page 678.

But Mr. Baxter says, page 739, "I also gather from his letter that he has in actual fact employed his men to rub the tar on trees with a rag in their 'bare hand.' This is surely a most objectionable way of

handling tar. It is a very serious matter to clean one's hands at night, after a day's tarring, although protected by a brush. What it must be after the rag process we can only be left to imagine." No doubt it is a very serious matter to clean tar off one's hand with soap and water, but these are not the only cleansing substances in the world. Let Mr. Baxter try the following experiment on tarry hands, and see how it works. Let a man with his hands well smeared, pour a little paraffin over them, then rub well together; or, which is better, a little cheap oil for lubricating machinery; or, best of all, a little olive or salad oil. He will be astonished to find, as the rubbing proceeds, how rapidly the tar softens and loosens from the skin, and that without the least mixture of soap and water. What we use most is machinery oil. Let him next rub them in clean hay, moss, &c. Sawdust is, perhaps, the best for this purpose. The first application may not make the hands as clean as ever they were, but the second should. After they are thus cleansed they may be washed with soap and water in the usual manner.

If Mr. Baxter tries the temperature of his hot tar, when in its thinnest state, for tarring either fences or trees, he may find it varying from 212° (the temperature of boiling water) up to 300°, he therefore can judge for himself whether or not his "men must have killed his young hollies by scalding them with boiling tar."

The certain gentleman Mr. Baxter refers to, said in effect that young trees with brush-guards tied round them, became shambling and unhealthy for want of air freely circulating round them, and if this theory as I said, page 267, can be clearly established by facts, then the bark-guards must have the same injurious effects, because they also seriously prevent the free circulation of air as well as light around them.

As I do not feel disposed to follow Mr. Baxter to hot climates in search of facts to illustrate his theory, and as we appear to be fast drifting astray from our original subject, this is my last.

D. M'CORQUODALE.

Dunrobin.

SIR,—I see a letter in your last number (page 739) by Mr. Baxter, in which he lays down Mr. McCorquodale's plan of rubbing tar to trees with the "bare hand," as being altogether objectionable, and I am under the impression that he is quite right in doing so. I myself have worked with the "rag," and can testify to the fact that it is a most disagreeable and awkward process.

It is obvious that Mr. McCorquodale cannot speak of the matter from personal experience, otherwise his views on the subject would be quite the reverse of what they are.

I am of opinion that thanks are due to Mr. Baxter for expressing himself in favour of giving "fair play," as it were, to the working man.

ASSISTANT FORESTER.

Feb. 10, 1882.

CAN SAWDUST BE USED INSTEAD OF STRAW FOR BEDDING?

SIR,—I should be glad if any of your readers would state their experience with sawdust used as bedding in place of straw for horses or cows. On many estates sawdust accumulates rapidly, and is carted away into some hole or pit, as a useless commodity. Now, if it is found not to be injurious to horses' feet, or to the udders of milk cows, I see no reason why it could not be used with advantage, when straw has to be bought at £3 to £4 a ton.

I have been told that *dry* sawdust is very injurious to horses' feet, but not so when it is wetted, or in a damp state; also that sawdust from

fir-wood is injurious to the udders of milk cows.

Perhaps some of your numerous readers connected with estates where sawdust is, or has been used, will state their experience.

A SUBSCRIBER.

Feb. 21, 1882.

LARGE TREES ON THE WILTON CASTLE ESTATE.

SIR,—I send you the measurements of a few trees upon Colonel Alcock's Wilton Castle Estate, Co. Wexford.

Circumference at five feet from the ground:—

<i>Pinus insignis</i>	...	4 ft.,	height 35 ft.
<i>Pinus maritima</i>	2	" 7 "	25 "
<i>Pinus Austriaca</i>	1	" 9 "	17 "
Scotch Fir	.....	1 " 5 "	20 "
Oak	.....	0 " 10 "	18 "

The above are only 20 years planted. The *P. insignis*, *maritima*, and *Austriaca* are all on the outside of the plantation with an exposure to the north-west; soil a yellow clay, resting upon rock of the trap formation. I also found upon the same estate at an altitude of 600 feet above sea-level, on Bree Hill, a few *Pinus insignis*, and a clump of *P. maritima*; *P. insignis* growing luxuriantly about 25 feet high, and densely clothed with foliage to the ground. This is one of the worst exposures for trees that I have seen, the Scotch fir blasted, and not much better than a mere bush. Colonel Alcock informed me he planted the few *P. insignis* and *maritima* about 20 years ago, just as an experiment, and I may say he has had the pleasure of seeing his experiment thoroughly successful.

The above measurements show the difference of growth compared with our native trees in the same soil and situation, and under the same treatment.

GEORGE DODDS.

Oriel Temple, Collon,
Co. Louth.

Feb. 17, 1882.

MEASUREMENT OF TREES.

SIR,—In my last communication (p. 677) I promised to point out the defects of M. Goursaud's table given in your *Journal* of last November, but on going farther into the matter I found so many errors that I considered it necessary to reconstruct it altogether, and, in doing so, I have taken the liberty of adding an extra column giving the contents as found by Hoppus's method. The last column, being entirely wrong, I

have replaced by a column giving the *true* contents of the trees as truncated cones.

I do not attach any value to the column giving the contents found by measuring the faggots, and, therefore, I struck out the word "true" in the heading. I, however, insert the figures, as I intend to revert again to this column; I also insert a column headed "No. of Trees" for future reference. The table, as corrected and amended, I now give as follows:—

No. of Trees.	Diameter at 1·33 m. from the ground.	Diameter in middle.	Diameter of butt end obtained by taper.	Height of timber.	Contents by Hoppus's method.	Contents as found by splitting into faggots.	Cylindrical contents by diameter in middle.	Truncated cone, contents by the two end diameters.
	Metres.	Metres.	Metres.	Metres.	Cub. Mtrs.	Cub. Mtrs.	Cub. Mtrs.	Cub. Mtrs.
1	0·229	0·178	0·239	16	0·313	0·404	0·398	0·413
2	0·267	0·229	0·273	22	0·713	0·808	0·906	0·916
3	0·286	0·239	0·296	16	0·530	0·634	0·672	0·685
4	0·293	0·223	0·307	16	0·490	0·612	0·624	0·654
5	0·312	0·261	0·318	24	1·009	1·167	1·284	1·304
6	0·318	0·242	0·329	21	0·768	0·919	0·965	1·007
7	0·344	0·261	0·353	25	1·051	1·277	1·337	1·392
8	0·369	0·293	0·379	23	1·217	1·414	1·550	1·595
9	0·382	0·280	0·396	22	1·064	1·414	1·354	1·432
10	0·401	0·331	0·408	27	1·825	2·095	2·323	2·365
11	0·414	0·312	0·424	28	1·681	2·088	2·140	2·232
12	0·433	0·331	0·445	24	1·622	1·906	2·065	2·146
13	0·490	0·331	0·508	26	1·758	2·374	2·237	2·450
14	0·511	0·401	0·521	30	2·977	3·732	3·788	3·901
15	0·630	0·439	0·653	25	2·976	3·942	3·784	4·083
Totals					19·984	24·776	25·427	26·575

In conclusion, just to show those of your readers who have not yet gone into the figures an example from the table, in English measures,

I will take Tree No. 1, the dimensions and contents of which are as follows:—

No. of Tree.	Diameter of small end obtained by taper.	Diameter in middle.	Diameter of butt end obtained by taper.	Length of timber.	Quarter girt.	Contents by Hoppus's method.	Contents as a cylinder.	Contents as a frustum of a cone.
	Inches.	Inches.	Inches.	Feet.	Inches.	Cub. Feet.	Cub. Feet.	Cub. Feet.
1	4·608	7·008	9·408	52·496	5·504	11·060	14·062	14·811

I will be glad to know if any of your readers ever saw such a tree.

JAMES DUFF.

Freeland, Bridge of Earn, N.B.

MEASURING THE HEIGHT OF TREES.

SIR,—Your remarks at p. 731, on foresters learning to estimate the

total height of a tree by the eye alone, calls attention to a point in which the average forester is remarkably deficient. It is the easiest thing in the world for any man with good eyesight to calculate at a glance the height of any given tree of which he can get a full view. A few hours' practice will train the eye to measure the height of a tree—say in 10 ft. lengths—as quick as

it can be run up. In practice, I find a length of 10 ft. to be the best, although others may prefer a longer or shorter length, as suits their fancy. The observer should stand as far back from the foot of the tree as is necessary to obtain a full view of it from top to bottom, which will be about one-and-a-half times its height; then run the eye up the tree, counting every 10 feet, or whatever the eye-measure may be, and the thing is done in an instant, with wonderful accuracy.

EBOR.

SIR, — Apropos of estimating the height of tree trunks (which you referred to at p. 731 in the February issue), a good practical way to learn to do this, is to have a white rod, 5 or 6 ft. long, and place it against a tree, and go back 25 or 30 paces, or even less, and estimate how many lengths of the rod equal the height of the trunk. Any one may soon learn to do it very correctly in this way. You may even use a rod 10 ft. long.

J. P.

DISEASED LARCH.

SIR,—I accompany this with two cuttings off a young larch, six or seven years old, on which are found a number of fungi like those specimens I send. Would you kindly tell me the history of this fungus, its name, origin, and probable effect on the tree? This is not a singular case in the plantation, but one unhappily of frequent occurrence.

H. PENRY POWEL.

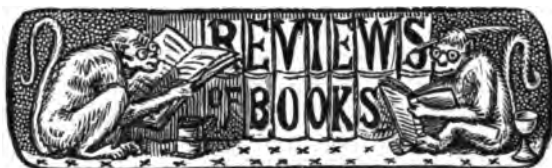
Castle Madoc, Brecon,

Feb. 8th, 1882.

[The small fungus on the dead twigs sent by our correspondent is *Peziza calycina* (Schum.), well known as being commonly found on dead or diseased larch, especially on such as has been frostbitten, or affected with "blister." It is found on diseased or decaying larch everywhere the tree grows, and occurs throughout the United Kingdom. Its effect upon sickly trees will be to hasten their decay and death. Where trees are in vigorous health, they may overcome a few spots of fungus; but if a tree is much infested by the *Peziza*, or any other fungus, there is small chance of it ever being a thrifty tree, and the sooner it is removed the better.—ED.]

OLD YEW TREES IN SUSSEX.

ONE of the noble yew trees in the churchyard of Sullington, Sussex, sustained much damage from the fall of snow which took place on the 10th December last. The late severe gales that have played havoc with so much timber have left these unscathed; in fact, it is very seldom that the tough wood of the yew yields to the force of the wind; but when the sudden weight of a heavy fall of snow bears vertically on the joints, threatened by centuries of decay, the crush comes. The ruin in this case is a sad one, but from an examination of the condition of the wood it appears to have been inevitable; it is only astonishing to think how so little sound wood could have supported such a vast mass as it did. About one-fourth (or perhaps one-third) of the old tree was borne down, and the remainder appears to be much in want of some artificial support—such as has been given, by means of stout iron ties, to one of the other trees—to avoid a similar disaster. The following measurements will be of interest: the girth of the damaged yew is 15 ft.; of that which stands in the east of the churchyard, 19½ ft.; the arm broken off showed a circumference of some 7 ft. at the fracture. We should much like to be furnished with the girth of the finest yews in Sussex churchyards.



The January issue of the *Florist and Pomologist* opens with a good plate of *Lilium Parryi*, and *L. polyphyllum*. The article on "Vines and Vine Culture" is continued, accompanied with illustrations; and the usual amount of interesting matter—including a new feature, "The Register of Novelties"—help to form a good number of the magazine.

The February number is fully up to the average. Two plates of fair execution are presented—"Dahlias" and "Plums." The article on "Vines and Vine Culture" is still running, and a variety of other subjects of interest are well treated of.

OUR FOREIGN EXCHANGES.

IN a previous issue, p. 687, was given a translation of a paper on the *Polyporus fulvus* which had appeared in the *Revue des Eaux et Forêts*. In the number now before us there is a paper on another species of the same fungus, *Polyporus igniarius*, Fr., the so-called Hard-tinder, by the same cryptogamist, M. D'Arbois de Jubainville, of which the following is a translation:—This fungus is very common upon oaks. It is found also on plum trees, almond trees, cherry trees, apple trees, and pear trees. It makes its appearance also, but more rarely, on poplars, willows, yoke-elm, and beeches. In orchards it causes premature death in many trees after having caused them to languish for a length of time. It is widely

diffused over the whole of France, according to what we have seen; and in Sweden, in Germany, and probably throughout the whole of Europe, according to Robert Hartig, who made a special study of it.

The spores of the parasite germinate on the oak and develop themselves in places where it has been despoiled of its bark, be it by pruning or by the rupture of a branch, be it by a wound occasioned by lightning, the fall of a tree, the wheel of a passing waggon, or by any other accident. The mycelium vegetates in the liber, the sap, and the bark of the oak. When it penetrates the wood it gives to it a brown colouring, to which succeeds a blanched yellow colour; and this in such a way that the affected wood presents the appearance of a yellowish mass surrounded by a narrow brown border. The mycelium develops itself much more rapidly in the direction of the vessels than in that of the rays; and thus it comes to pass that in the perfect wood one sees often at the limit of the wood occupied by the mycelium numerous concentric layers or groups of vessels which are of a blanched yellow, and surrounded by a brown tissue, less decomposed. If there be cut off a portion of a wood invaded by the *Polyporus igniarius*, and this be left in a moist atmosphere, the section will clothe itself with a velvety covering, at first yellowish, then brown. Under the section the wood will often show a bright yellow in a zone some centimetres in thickness, and bounded by a narrow band of deep brown. According to Robert Hartig the

mycelium of this fungus increases annually about two centimetres in the circumference of the oak, and from four to eight centimetres in the longitudinal direction. But according to our observations it has often a much more rapid increase in the longitudinal direction, especially downwards. The wood decomposed by this *Polyporus* loses three-fourths of its weight, but it is neither cleft nor cracked.

The fruit-bearing receptacle of the *Polyporus igniarius* does not always arise on the wound through which it has been introduced into the wood. As a matter of fact, from the sap the mycelium extends into the liber, pierces frequently the rhytidome, and reaches the bottom of the crevices with which this is furrowed, and then it gives origin to a fruit-bearing receptacle.

This is at first like a small pad, somewhat tufted, of a tan colour, and pierced with a few pores. Then it becomes rounded, and approximates to a semi-orbicular form. The inferior face of this is penetrated with very strait pores, very regular, vertical, in quantity innumerable, and tan-coloured, but ultimately sometimes a little blanched by a deposit of oxalate of lime. On its inferior face it increases annually by a layer projecting beyond that of the preceding year, forming concentric pad-like protuberances. Often one of these covers several of those formed in previous years, so that the number of them becomes less than that of the annual layers. The upper face of the pileus or cap becomes glabrous and blackish, and thereafter it takes a horseshoe shape. Ultimately, by concentric clefts, a portion of the pad-like protuberances becomes separated, and by other clefts they become divided vertically. The upper surface of the cap is never perforated with pores as is that of the *P. fulvus*, to which it is nearly allied. The flesh of the cap is tan-coloured, hard like wood, and formed of superim-

posed and very distinct annual layers.

Every tree attacked by the *P. igniarius* should be felled at once, that it may not become further deteriorated and depreciated.

In the Spanish *Revista de Montes* are given notices of abuses in the forests of Cueva; a translation of a paper by M. Saltus, in *Les Mondes*, on the effect produced on marshes by the growth of the Eucalyptus; notices of forestry in Portugal; notices of the management of forests belonging to private proprietors and corporations; and notices of Artesian Wells in different lands.

From Trieste have been received tabulated comparative statements of imports and exports of oak in Trieste and Fiume, 1880 and 1881; the statements of exports giving the ports in different countries to which they were made. The countries include Britain, France, Portugal, Spain, Italy, Greece, Turkey, Algeria, and Bombay; and the statements show an importation in 1881 of 34,920,804 against 42,220,489 in 1880, and an exportation in 1881 of 34,109,203 against 43,919,810 in 1880.

JOHN C. BROWN.

SOUTH AUSTRALIAN FORESTRY.

THE following report on the Wirrabara Forest Reserve will be read with interest. The nursery is an enclosure of about six acres, a third of which was originally a swamp. The soil is a magnificent black sandy loam of great depth. This has been thoroughly drained and laid out in parallelogram form, with metalled paths of limestone. The remainder of the enclosure is on sloping banks, upon which standard trees of different kinds have been planted six feet apart. On these we noticed *Pinus insignis*, walnut, English ash, *Pinus halepensis*, blackwood, sycam-

more, and hickory. The walnuts average 11 ft. for three years' growth. No doubt the site is particularly favourable, but we note this result just to show what can be accomplished in the North with fruit trees of the nut species. On the bottom land the Board grow their forest trees. Although the soil is somewhat rich and moist, and therefore perhaps unfavourable for nursery purposes, the stock of trees annually turned out is of a fair quality. Lately, however, a number of trees are being reared upon an adjoining piece of land, the soil of which is of an inferior character, and the site away from being influenced by the soakage from the creek. The buildings here are very substantial stone cottages occupied by the nurseryman and forester, and other outbuildings comprising stable, tool-shed, chaff-house, and propagating shed. All the available ground is occupied with a promising stock of the following kinds of trees:—Cypresses, *sempervirens* and *torulosa*. Pines, consisting of *insignis*, *halepensis*, *maritima*, *pinæa*, *longifolia*, *Parryana*, *ponderosa*, *sylvestris*, *excelsor*, *Jeffreyi*, and *Lambertiana*. Two kinds of *Abies*, namely, *Smithsiana* and *Webbiana*, *Wellingtonia gigantea*. Both the American and English ash, weeping willows, the English and also the cork elm, sycamore, palm tree, carob, walnut, and last, but not least, the English oak.

On our way homewards *via* Stone Hut-road, we passed a small enclosure of about fifty acres. This has been entirely planted with *Pinus insignis*, English ash, Tasmanian blue gum, sugar gum, walnut, Kingston sheoak, red gum, and jarrah. Planting was commenced here three years ago, and now the block contains some 20,000 trees of the kinds already stated. The result has proved very satisfactory, and we particularly noted the wonderfully healthy and strong appearance of English ash, walnuts, Tasmanian

blue gum, and the *Pinus insignis*, the latter especially catching the eye, as they occupy a commanding knoll on the northern side of the enclosure, which in the early days had been a sheep camp. We were particularly pleased with the look of these pines, as their growth indicated thorough healthiness, and the successful way in which these trees strike and the rapidity with which they grow point them out as one of the most suitable trees for culture in the North. The ash, of which there are over 10,000, occupy the lower-lying portions of the enclosure, and as they were just coming into leaf when we saw them, they presented a really fine field of a pea-green colour, which contrasted well with the more sombre garb of the *insignis* in the background. A few of the jarrahs here have attained the respectable size of about 6 ft. in height, and the sugar and Tasmanian gums have now attained an average height of 10 ft. We next visited plantations D and F, which together comprise an area of about 1,000 acres. These are wholly devoted to the encouragement of natural growth, and from the indications we saw the result is likely to be highly satisfactory should they escape being run over by bush fires during the coming summer.

Outside the various plantations which we have just referred to we were pleased to see that the proper conservation of the natural forest is not being lost sight of. It is evident that the Forest Board are here doing their utmost to make the most of our indigenous and valuable gum trees. Notwithstanding that the forest has been stocked with sheep for a period of two decades, and that before it came into the hands of the Board considerable destruction of the virgin forest took place by splitters and others, a large and valuable growth of saplings has come up on various parts of the ground. It seems to be part of the Board's work to have the saplings properly attended to.

This is done by going over the ground systematically in blocks and pruning and thinning the saplings. We were told that between three and four thousand acres have been gone over in this way outside the plantation enclosures, and from the fine straight appearance of the numerous saplings which we observed on all sides of us as we drove through the forest the success of this kind of work is undoubted, but there is still plenty of scope for additional work in this direction, and believing as we do that the work is a most valuable one, we trust the Board will see its way to continue and expand it here as much as possible in their future operations. By reference to the Conservator's report we find that over 2,000 saplings have been thus attended to.

Much has been said during the last twelve months for and against the timber of the Wirrabara forest. The principal trees here are red gum, blue gum, sugar gum, and box. A very large quantity of timber has been removed from the forest since the settlement of the northern areas, and it was thought, and many people still think, that the glory of the forest has departed. When, therefore, the contractors for the construction of the Terowie and Orroroo railway, Messrs. Kean & White, intimated that they proposed securing all the timber they required for the line from the Wirrabara forest, the idea was pooh-poohed as a wild one and likely to end disastrously to them. Even the splitters who had been in the forest for years past said that the timber for railway purposes could not be secured from the forest. Undaunted, however, by these unfavourable prophecies, Messrs. Kean & White erected no less than three large engines in the reserve. These engines have now been some twelve months at work, and during that time have turned out no less than 8,000 sleepers of red, sugar, and blue gum timber. We understand that this was the first time that timber known as sugar gum

has been used in the construction of public works. The tree which bears this name is a magnificent monarch of the forest, attaining a larger size than any other specimen of the eucalyptus tribe in the Wirrabara forest. It grows chiefly upon the higher-lying ranges, and almost invariably upon soil of a strong iron-stone character. In height it often reaches 160 ft., with a diameter of from 4 to 6 ft. It has a straight, well-proportioned barrel, which sometimes may be seen 60 ft. high without a branch. The bark is of a whitish yellow colour, and the foliage a dark sombre green. The timber is remarkably solid, and possesses a specific gravity of about 75 lbs. per cubic foot of timber. As there seems an almost unlimited supply of this timber in the forest, it is to be hoped now that it has been proved beyond doubt that it is the most valuable timber which we possess in the colony, that it will be used in all future public contracts carried out in South Australia. We do not hesitate to say that there is sufficient timber in the Wirrabara forest to construct all the railways which we are likely to have in our north for very many years to come.

We visited what are known as the No. 4 saw-mills. These are situated about two miles north of the nursery establishment, and comprise two full-powered engines, with all the appliances for the hauling of the logs, &c., complete. The site of the mill is in a hollow, to which the logs are drawn from the forest in a very easy and thoroughly systematic manner. The appearance of the mill, the various houses of the workmen, the manager's house and office, stables, blacksmith's shop, &c., presented a very pleasing and instructive spectacle.

The manner in which the logs were drawn in and the rapidity with which these were sliced down into the required sizes of sleepers, &c., is very creditable to the proprietors, to whom we wish the success they deserve.



TREE ROOTS CHOKING DRAINS.—At a meeting of the Royal Botanic Society, held on the 11th ult., a curious example was exhibited of a drain-pipe completely filled and choked by the roots of an elm tree. Several specimens of the same kind of growth preserved in the Society's museum were also exhibited. Several of the fellows took part in the discussion upon the subject, some notable examples being mentioned, particularly one case in which a well was choked up by the same process. The secretary remarked that the choking of drains in the vicinity of trees was often caused by a single small root entering the drain between a joint in the pipes; it then branched and ramified into a vast number of fibres matted together like a mass of oakum, and completely filling the pipe. This action was not confined to any particular species of tree, and often occurred at a much greater distance from the tree than the roots were generally supposed to extend.

A REMARKABLE DISCOVERY OF A BIRD'S NEST.—When the sawyers of Messrs. Barr and Shearer, Ardrossan, Ayrshire, were lately cutting a wych elm, they came across a bird's nest in the stem of the tree containing five or six eggs in a complete state, but suffering from dry rot. Unfortunately the saw destroyed the eggs, but they were still recognisable, and a competent authority could easily have told of what kind they were. The nest had originally been built close to the main stem, or at the root of a branch, and evidently forsaken, and in the course of time the wood had grown round it. It has thus lain imprisoned for probably fifty years or more, and although it has escaped the hands of mischievous nest-hunters, it has been found out at last in this curious fashion.

APPOINTMENTS.—Mr. George Dodds has been appointed steward and forester

to Lord Massareene, at Oriel Temple, Collon, co. Louth, Ireland.

Mr. J. M. Forsyth has succeeded the late Mr. Manners as wood manager at Gowan Castle, co. Kilkenny, Ireland. Mr. Manners, who died about three months since at the age of seventy years, had been for nineteen years in charge of the woods on the Clifden Estates, and was greatly esteemed by all who knew him.

Alexander Pitcaithley, assistant forester to Mr. Baxter, forester to His Grace the Duke of Sutherland at Dunrobin Castle, Sutherlandshire, has been appointed forester to Her Grace the Duchess of Sutherland, at Castle Leod, Strathpeffer, Ross-shire.

Mr. John McLaren, foreman forester on the Scone Estate, Perth, has been appointed forester and land steward upon the Caver's Estate, Hawick. Mr. McLaren, who was much respected, was entertained by the assistant foresters on the Scone Estate, prior to his leaving to accept the new appointment, by a supper at Henderson's Hotel, Scone, on the night of February 17th.

BURIED IN A TREE.—Some distance up Otago Gorge, near Opotiki, New Zealand, an enormous puketea tree, probably many hundred years old, has been blown down, says an Australian paper, disclosing the astounding fact that the whole of the hollow interior, extending from the roots to the first fork, about 45 ft., had been filled with human bodies. Since it fell these had burst out at the butt of the tree in the form of a confused heap of skeletons. A more extraordinary sight than this monarch of the forest lying prone and discharging a perfect hecatomb of human skeletons can scarcely be conceived. Some are nearly perfect, while others are mixed up in a chaotic mass of heads, hands, feet, arms, and legs indiscriminately.

AGE OF THE MISSISSIPPI DELTA.—The Philadelphia *Telegraph* states that an examination of the delta of the Mississippi shows that, for a distance of about 300 miles of this deposit, there are buried forests of large trees, one over the other, with interspaces of sand. Ten distinct forest growths of this nature have been observed, which must have succeeded one another. These trees are the bald cypress of the Southern States. Some have been observed over 25 ft. in diameter, and one contained 5,700 annual rings. In some instances, too, these huge trees have grown over the stumps of others equally large. From these facts geologists have assumed the antiquity of each forest growth at 10,000 years, or 100,000 for the whole. This estimate, however, would not include the interval of time that elapsed between the ending of one of these vast and wonderful forests and the beginning of another.

LOMBARDY POPLAR IN NORFOLK.—At a meeting of the Norfolk and Norwich Naturalists' Society at Norwich, Mr. H. D. Geldart read a paper on the destruction of the Lombardy poplar in the county of Norfolk, in the year 1880-81, which was principally a summary of replies to a circular issued by the secretary in September last. From these replies it appeared that at least half the poplars in the county were killed in that winter, and that a very small proportion had escaped injury, and that it seemed impossible to connect the mischief with any particular wind, or to show that it came from any particular quarter. It also appeared that no special cause, excepting the weather, could be assigned, but that the origin of the damage was the long-continued low temperature and unprecedented rainfall of the season of 1879-80, which, acting on a tree of feeble constitution, had so weakened it as to render it unable to bear the frost and snowstorms of the winter 1880-81. This view was supported by extracts from the quarterly reports of the Registrar-General, commencing July, 1879. Replies to letters were quoted, to show the extent of the damage to Lombardy poplars beyond the limits of the county, from which it appeared that the injury was greatest in eastern and east midland England, extending north to Yorkshire, and diminishing westward, till it ceased in the western counties and in Wales, bearing a curious

though possibly fortuitous direct proportion to the intensity of the frost of December 7, 1879—the coldest day of that winter, when a minimum temperature of 1° below zero was reached at Cambridge, Nottingham, and Stockton, and the cold diminished westward to a temperature of 27° at Torquay, and 28° at Llandudno.—*Field*.

SOUTH AFRICAN FORESTS.—At a recent meeting of the South African Philosophical Society, attention was called to the haphazard system pursued in connection with the management of the forests in the Knysna district, owing to the practice which prevailed of wood-cutters felling a tree and destroying a couple of hundred other trees in getting it out. The wood-cutters, who do the mischief, are represented to be merely squatters, having no holdings, and generally in the hands of the wood-merchants. The Knysna forest, one of the few remaining forests of the colony, will, it is feared, if no action is taken by the Government, soon be a thing of the past. The entrance to the harbour only wants a little deepening to make it one of the finest on the coast, as the water in the river is just as deep now as it was when surveyed many years ago; but if the forest is destroyed, the depth of the river must be seriously affected. Last year some 9,000 tons of wood were shipped, independent of that sent inland.—*Indian Agriculturist*.

A FOREST OF STONE TREES.—From 20 to 35 miles from Denver, between Cherry Creek and Running Creek, the Denver and New Orleans railroad forces struck an unusual obstruction, it being nothing less than a buried forest. The trees are all petrified and agatized, are of all sizes, and lie buried at various depths, from 10 to 20 ft., which is as deep as any excavations were made by the workmen. They came upon these relics of a by-gone age in at least half-a-dozen localities, and have met with not a little difficulty on their account. The trees are very perfect, and could be taken out nearly whole if suitable machinery was employed.

QUICK GROWTH.—A rain-tree in the public gardens of Madras has shown a remarkable rapidity of growth. In the nine years since the seed was planted the tree has attained a circumference of 9½ ft. at the ground, a height of 46 ft., and a spread of branches of 85 ft. from north to south.

THE JOURNAL OF FORESTRY & ESTATE MANAGEMENT.

CURIOUS AND HISTORIC TREES.

LORD BEACONSFIELD shared the universal love for trees, and in the rapid and attractive narrative of his novels, when the hero is travelling through rural England, the beauty of the sylvan scenery is often noticed. In a letter to Mr. F. G. Heath, author of "Burnham Beeches," he remarked that it was not wonderful the ancients should have worshipped trees. The beech was one of his favourites not only for its beauty, but as the native tree of Hughenden and Buckinghamshire.

The beech in England is a native of restricted range, though it grows alike at Hughenden and Hawarden. In calling at the latter place, for the sake of the old castle and the new residence and its associations, and for that of the timber, which Mr. Gladstone has always diminished considerably when in opposition, I asked for the latest victim of his axe. It had been a beech which stood on the slope between the house and the original castle, and it had met its fate on account of the signs of decay which the trunk had begun to exhibit. It is extremely doubtful whether the beech is indigenous in the Hawarden district or in Wales. In travelling through the Principality I observed that it is sparingly distributed in the valleys of North Wales, where the larch, a tree of the last century, is common. As it ripens its seeds readily in Wales it ought, if it were native, to be found growing as a tree or shrub in inaccessible places. The beech dwarfs readily, and, as a dwarf, it caps the poorest and most elevated chalk hills of Sussex, Surrey, or Bucks. It is a tree which has a remarkable power of fastening itself on thin soils, spreading its roots over a solid face of sandstone, or chalk, attaining a large size on sites where oaks or elms would starve. The roots of all trees possess an alternative power, and are capable of conversion into stems producing bark.

In the deep lanes of Surrey, in the neighbourhood of *Silva Evelyn's* beloved Wotton for example, the roots of beech trees converted into stems by exposure to the light, as the soil of the steep banks has washed away, run over the whole surface of the ground, and in many cases giant trees are supported on sites which they could not possibly

have occupied but for the underpinning of their trunks through the conversion of their weak roots into props and struts or holdfasts. The cuticle of the root is converted into bark on exposure, and in the case of a growing tree an annual deposit of wood thenceforward takes place. In a plantation on sloping ground near Ditchley House, Oxfordshire, which formerly belonged to the staunch old cavalier, Sir Henry Lee, I observed that where the soil had been washed away during the past fifty years, the shallow roots of the beeches have become barked over, and have spread upon the surface in the manner I have described, and the trees on that hard thin rag must have been overturned but for the special support they have received. At the base of each tree, extending from the trunk, three or four ribs serve as buttresses, provided by good fairies, it might once have been said, but in these days of explanatory science the process of buttressing a tree is found to be purely natural. It has occurred through the exposure of three or four of the leading vertical roots, which have thus been able to acquire bark and to grow with the tree's growth as parts of its stem. Hence it follows that a tree growing in a natural basin and requiring no struts does not possess them, while a tree on a knoll is furnished by nature with the means of support when, in its early stages, before the ground is bound by the roots, the soil wastes from beneath it. The natural history of this subject, and the conversion of roots to stems, may be studied at the palatial residence of Cliefden, where Mr. Disraeli would sometimes take his guests, years back, and picnic in the grounds, when the party would drive and ride back to Hughenden, a gay cavalcade, as full of mirth as the picnic parties in "Lothair."

One would have looked for the beech rather than the oak in Wales so far as the difficulties of the sites among the mountains are concerned; but this tree of chalks and sands does not affect clay rocks, shales, or slates, and I did not anywhere observe it except in positions where planters had introduced it. Mr. Hewett C. Watson's "*Cybele Britannica*; or, *British Plants in their Geographical Relations*," is the best authority on this subject, and Mr. Watson estimates that the beech grows spontaneously in thirty counties, the oak in seventy-five. It ascends in England to an altitude of from 300 to 600 feet, and he believes it to be an introduced tree both in Scotland and Wales. The oak is hardier, and ascends even in the Highlands of Scotland to an altitude of 1,500 ft. With regard to distribution, "It may be said," Mr. Watson observes, "that the beech is certainly native in the provinces of the Channel and Thames, probably so in those of the Ouse, Trent, Mersey, and Severn, also in the peninsula, at least in the most easterly county of Somerset." Selby says of the beech in "*British Forest Trees*," "Its limit as a native seems to be

confined to the dry calcareous districts of the central parts of England, or that great ridge of chalk hills which occupies a large portion of several counties."

In these native homes of the beech it often exercises an exclusive right of occupancy to the exclusion of all other kinds of timber. It frequently does so on the chalk hills of Sussex, Surrey, and Hants, and throughout the Chiltern Hundreds of Bucks surrounding High Wycombe, the seat of the famous chair manufactory, and burying in dense coverts the former homes of the long-descended Hampdens and Penns. Patriots and statesmen must have loved this graceful tree. It ornaments Blenheim, and forms in fact



BURNHAM BEECHES IN SUMMER.

From "*Burnham Beeches*," by permission of MR. F. G. HEATH.

almost the only tree of the woods there; for though the "rags" of Kent are rich, belonging to the lower greensand formation, which is fruitful for hops and orchards, and worth to rent several pounds per acre, the "rags" of Blenheim are among the poorest of the oolite beds, dear at 10s. The beloved home of Edmund Burke stood among the beeches too, and behind the charred site of the house of which he fondly wrote, "beneath this roof every care vanishes," there is a beech wood in which he used to ramble and watch the golden glory shed upon the tall trunks by the declining sun.

In the same county of Bucks, within a drive either of Beaconsfield

or Hughenden, and two or three miles from the railway station at Slough, still stands, thanks to the Corporation of London, the famous little forest of Burnham Beeches. There are 226 acres of beech woods planted in every part with trees not less surprising for size, beauty, and ruggedness, than the engravings of "Burnham Beeches in Summer" and "Burnham Beeches in Winter" in these pages.

The artist has perhaps selected parts of the wood which pleased him best, but all the trees are nearly or quite as remarkable as those that are here represented.

Several of our most remarkable historic trees owe their rugged heads and gnarled and knotted crowns to the operation of pollarding performed upon them centuries ago and frequently repeated. The



BURNHAM BEECHES IN WINTER.

From "*Burnham Beeches*," by permission of MR. F. G. HEATH.

Cressage Oak is an example of this kind, and in like manner the Burnham Beeches owe their picturesque appearance and contorted branches to pollarding. I have already written on this subject in the *Gardener's Chronicle*, in reference to the age of trees :—

"The loss of limbs kills a tree by cutting off the supply of elaborated sap and destroying the bark beneath them ; and the result of the natural pollarding of the long-lived type of oaks, is that their life is renewed with their limbs.

"In the case of the Venison tree (in Bagot's Park) the remaining portion of the broken trunk has put forth a feeble spray, but the renewal of the foliage is probably insufficient to sustain the life of this patriarch of Bagot's Park for many more years.

"The form of growth most favourable to longevity consists of a head of several branches springing from the crown of a comparatively short trunk. The loss of one or more of these branches—which never go altogether—proves but the beginning of a new epoch in the existence of the parent tree. As fast as they fall they are followed by a growth of smaller branches, and thus a green old age of extreme length is secured. Oaks are said by Dryden to enjoy three centuries of growth and three centuries of maturity, and to suffer three centuries of age, dotage, and slow sinking into earth. In the case, however, of oaks of the long-lived type the last period is protracted far beyond three centuries."

The Burnham Beeches have long ceased to be hacked and pruned, having fallen under private control, like the adjoining domain of Dropmore, which Lord Grenville enclosed and planted, and their ~~sprays~~ of firewood have grown into fine heads. The trees owe their grandeur to their great age and size, and they owe their length of life and their divided heads and quaint aspect to the pollarding of former times. The stem of a pollard is usually squat and short, and being strong in proportion to its stoutness, it is far less liable to suffer the fate which overtakes long trunks when they become weak with age and break across below their crowns with inevitable ruin as the result.

The growth of a head from amidst the spray of small boughs when pollarding is discontinued, occurs through two or three of the branches taking the lead. This toughest of all forms of trees must have been observed by visitors to Epping Forest when the commoners of the Crown enjoyed the right of pollarding the trees, and top-lopped them accordingly without stint. It was the disuse of this ancient right which produced that wondrous growth of beeches which poets and artists have celebrated, and which Gray called a forest. He spoke of the site as "all my own," and "covered with most venerable beeches." Gray's house, which he described as "a compact box of red bricks with sash windows," then called West End Cottages, now enlarged, and known as Stoke Park, lay, as he wrote to Horace Walpole in 1737, "at a distance of half a mile through a green lane." Near it is Stoke Pogis church, and the ivied tower, the scene of Gray's *Elegy*, where

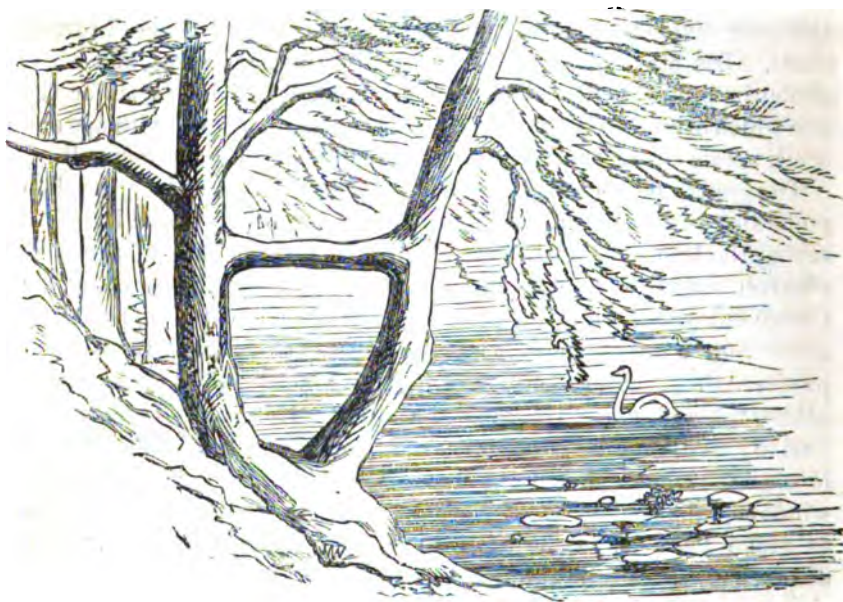
"The curfew tolls the knell of parting day,"

and where, in the open churchyard, amidst the "rude forefathers of the hamlet," the poet sleeps in the same tomb with his mother.

Other celebrities have dwelt here, amid the beeches, which is one of those trees that draw beneath its shade great men and noted dwellings. Mr. Grote lived on the margin of the common in History Hut, which he built on the profits of the "History of Greece," and here, in 1855, Mrs. Grote had a bowl of punch brewed to celebrate the completion of the great history. Not far distant you enter Dropmore's 600 acres of pinetum and pleasure gardens, where noble specimens of exotic conifers, under the care of Mr. Frost, are mingled with the

natives of the former common ; and crossing a high road, you reach the "proud alcoves" of Cliefden, where, at the time of my visit, Mr. Fleming, the eminent gardener, and guardian of a most beautiful domain, showed me its glories, including the beeches. Hedsor Park joins the two last-named estates, and the spot where the three properties meet is appropriately called "Nobleman's Corner." Throughout this neighbourhood of noble seats the beech is the native and prevailing tree.

The engraving of "A Holdfast" (which, with the Dean Forest Yew, has been kindly lent us by the Proprietors of the *Gardener's Chronicle*), shows the double stem of a beech growing on the steep slope near the dairy at Arundel Park. The phenomenon here presented was described



A HOLDFAST.

in the *Gardener's Chronicle*, July 23, 1881, p. 119, as a "bifurcation of the stems of a beech tree." The ground rises above the lake at an angle of 75° . The contributor of the sketch writes of the original :—

"The tree had two stems of about equal thickness—one stem nearly upright, the other leaning at an angle of say 50° over the lake. At 3 ft. from the base an arm 3 ft. long and from 7 to 9 in. in diameter stretched from the upright to the procumbent stem. The arm was considerably larger at its junction with the stems. The tree was probably forty-five years old."

He assumes, with truth, I think, since the theory is essentially the same as that I have propounded—

"That the stems as high as the arm were once only roots or underground stems,

and that the growth of the tree resulted in lifting the stems and with them the arm to their present position. The suspended trunk evidently owes its security and existence to the friendly arm outstretched to hold it."

The "friendly arm," like the leaning stem on the right, were originally roots which were laid bare at an early stage of the tree's growth, and have since grown with its growth.

In the very interesting account of ancient yew trees in the *Gardener's Chronicle* (May 30, 1874) by the Rev. Edwin Lees, an engraving of one of the trees presents an example of the stem extending around the base of the trunk as in the case of the beeches I have before noticed. Mr. Lees

describes his sketch as that of an "old stump and bole of yew in the 'Schowles,' Forest of Dean."

I have not seen the tree, but the part beneath the collar of the root extending down the rock to the earth, has the appearance of roots which have taken the form of wood, barked over through exposure. This curious yew grows, says Mr. Lees, in a "spot within the confines of the Forest of Dean that bears the name of the 'Schowles,' commonly called 'The Devil's Chapel.' It forms a labyrinth of deep but narrow excavations, open to the day, which were made in ancient times to obtain iron ore, but they have been abandoned for centuries, and left for Nature to clothe. Vegetation of various kinds has taken possession of the aisles of this demoniacal locality, and ferns grow



OLD STUMP OF YEW IN THE "SCHOWLES,"
FOREST OF DEAN.

in its recesses most luxuriantly. Among various shrubs and trees that have taken possession of the deserted spot, the yew is the most conspicuous, its dark foliage shadowing the excavations in deeper gloom, and one yew in particular, seated in the summit of a rocky peak of carboniferous sandstone, is most conspicuous and remarkable. It is evidently of great age, for the lower part of the bole, which extends to nearly the bottom of the excavation, full 30 ft. is bare and dead, the upper part alone maintaining its vitality; but this is in a very vigorous state, and many of its branches hang gracefully down."

Among the historic trees, or aged trees without a written history, which I have seen scattered throughout England, the oak has occurred most frequently. Wistman's Wood, a group of curious old dwarfs on Dartmoor, has already been described in the *Journal of Forestry*, Windsor Forest has also been the subject of an illustrated paper, but there are fish in the sea as large as any that have been caught yet, and there are oaks and oak woods remaining quite as remarkable even though less widely known, than any that have yet been noticed. Bagot's Park in Staffordshire surprised me, when I first saw it, as a most extraordinary plantation of great oaks. I was introduced to these noble trees some years since when preparing a report of the agriculture of Staffordshire for the Royal Agricultural Society, and I endeavoured to describe them in the *Agricultural Gazette*, with the kind assistance of Mr. T. Pickering, Lord Bagot's agent, and of Mr. Turnor, the park ranger, whose son helped me in measuring them. The extent of park is 1,000 acres, and the whole of it is thickly planted with oaks, besides 1,300 acres of oak woods outside the park.

It has been estimated that £100,000 worth of oak timber might have been felled some years since when the price was 6s. per foot, without touching the ornamental timber. The spectacle of tens of thousands of great timber trees, many of them too venerable now to serve the purposes of utility, is a most unusual one, and the noble owner has sacrificed much in order to preserve this interesting illustration of an old park heavily clothed with native oaks, such as the clay soil of the country originally produced unbidden. There are a few other native trees, the wych elm, beech, birch, and hawthorn, but they do not muster strong enough to relieve the uniformity of the oak's dark green and characteristic outline. The one grand tree is everywhere predominant in clumps, beltings, and thick plantations, standing too thick upon the ground to admit of an extensive landscape, while in other places there is a grand sweep of distant outline with a view so long that the telescope must be used to make out whether the distant deer are the common or the red sort, or whether the moving specks upon the grass are the goats for which this park is noted. Size is indispensable to grandeur, and in the case of park landscapes, distance and breadth (representing size) must be allowed, or even the oak will fail in its effect in many instances.

If Bagot's Park were devoted entirely to the illustration of beauty in park scenery the axe would be freely used, to give more room both to the eye and to the atmosphere, and to avoid the occasional evils of too much shade and damp. The oaks are of the variety with stalked acorns, of small size, like almost all the oaks in this part of the country. The soil is a poor clay, yellow or slate colour, such

as farmers hate, and find much difficulty in improving. The geological formation consists of a patch of lias, the remnant of a wider area which once overspread this part of the country, and remains still on the higher ground unremoved by the deluge which washed away the rest of this overlying formation. The red marl of the new red sandstone formation lies below, sometimes as near as 6 ft. from the surface. Probably the oaks could not feed in a compact clay at a depth of so much as 6 ft.; and certainly the great trees are not invariably indebted to the underlying richer strata for their nutriment, but rather to the length of time given them to collect the materials of their bulk.

Mr. Pickering gave me the following particulars of some of the trees.

"The Squitch Oak is the largest tree in Bagot's Park. As measured in 1823, this tree contained 1,012 cubic ft., one limb alone measuring 79 cubic ft. The value at this date was estimated at £240 12s.; circumference at five feet from the ground, 21 ft. 9 in.

"The King Tree, when sound, was the most valuable tree in Bagot's Park.

"In 1812 a Mr. Bullock offered for the first length 12s.	
per foot	£200
The market price of the residue, including bark at	
£14 per ton, was estimated at	93

Value of the King Tree in 1812	£293
---------------------------------------	------

"T. Pickering sold the central portion of a windfall oak from 'The Cliffs' in the park in 1863 for £48.

"The 'Beggar's Oak' is the most picturesque tree in Bagot's Park, and certainly one of the most picturesque trees in England. Height to the crown, 33 ft.; height above the crown, 27 ft.; height, 60 ft. The butt and limbs, of which there are fourteen, contain upwards of 850 cubic ft. of timber. The circumference of the butt immediately above the swell of the spurns is 27 ft. 3 in., and at five feet the circumference is 20 ft. The branches extend upwards of 50 ft. from the butt in every direction. The spurns, or roots, of the tree which project above the surface of the ground for a considerable height, measure 68 ft. in circumference.

"The Venison Tree is supposed to be the oldest tree in Bagot's Park, and in existing records is shown to have been a tree of note upwards of 600 years ago. This makes it at least coeval with the Conquest. I am of opinion, however, that it dates much further back."

The above measurements are identical with those of Mr. J. G. Strutt, as recorded in his "Portraits of Forest Trees," 1824. During the past fifty-two years, however, the circumference of all the trees

has increased, according to measurements taken at the same height by Mr. Turnor and the writer.

The Squitch Oak has increased from 21 ft. 9 in. to 23 ft. 2 in., and the Beggar's Oak from 20 ft. to 23 ft. 2 in. The longest lateral limb of this last tree extends 55 ft. from the trunk, and its head is round and full of foliage, drooping almost to the height of a stag, and offering a welcome beneath in the heat of a summer day or during storms.

The King Tree in the cliffs on the north side of the park is 20 ft. round at five feet, and runs up without a limb 30 ft., and thence about 70 ft. to the top. In Bagot's Park Lodge, the residence of Mr. Turnor, whose family now number 200 years in the same service, the floor and furniture of a dining-room of 20 ft. long, besides the beams, wainscot, window recesses, and chimney fittings of the apartment, were obtained from a single tree.

A grand oak of the same species (*Quercus pedunculata*) as these, and similar to the oaks of Wistman's Wood, the oldest in England probably, towers above all others in Needwood Forest in the immediate neighbourhood. It is the most magnificent patriarch in this part of the country, and any tree lover may see it easily by alighting at Sudbury Station, in the fertile valley of the Dove, when he will soon observe the towering head of the Swilcar Lawn Oak on some high ground two miles distant.

According to Strutt, "Portraits of Forest Trees," 1824, this tree measured 19 ft. in circumference at six feet from the ground fifty-four years before his time, and at the date of his measurement he found the circumference 21 ft. 4 in. at the same height from the ground. Its present measurement at six feet is vitiated, so far as comparison is concerned, by a large and still increasing excrescence, but I think its girth has probably increased, as in the case of many old trees in their decay. At five feet it now measures 27 ft. The trunk runs up to a very great height, and carries some heavy and wide-spreading lateral limbs and an imposing head. Quoting from a former article—

"The largest limb on the west side of that tree fell twenty years since, measuring 90 cubic ft. There is a limb extending 46 ft. from the trunk on the south side, at a height of about eight feet from the ground, and skilfully supported by an iron rod. The corresponding limb on the opposite side has fallen; seven great trunk limbs yet remain."

There is a marked individuality in certain specimens of trees as well as in some men, and something in common will be found in both. Both oaks and men, for example, possess hereditary tendencies, though they may not both have nervous systems, and there are specimens of each in Needwood Forest which own unusual fibre and vitality. There was an old deer-stealer here, before Needwood was disforested, whose

strength was remarkable, and who lived to the great age of a hundred years, and he handed down his toughness and longevity just as some oaks do. His son still kept the grass round the Swilcar Lawn Oak neat and well shorn with a scythe at eighty-eight, and was cut off by an epidemic at ninety, and *his* son is now a very promising old fellow, and seems, by his appearance, not unlikely to attain the years of his grandfather, the deer-stealer, whose portrait he showed me, and whom he very much resembles.

Every acorn that the wind sows has, I suppose, a sort of family disposition planted with it. In trees the peculiarity I refer to may be called "habit," but whatever name their personal characteristics may be known by, there are oaks growing side by side on the same soil which differ greatly at the same age in size, toughness of fibre, and other respects. It is said that the toughest kind of oak is the aboriginal species common both to Needwood and to Wistman's Wood, and that the sessile-fruited species was an importation from the continent of Europe, and is much less durable. But have not these species or varieties hybridised? since well-marked distinctions of the fruit and leaf are now less common in many districts than the intermediate forms.

I may here add to the list of "curious" trees an oak in Bagot's Park, called the "White Tree," from its variegated leaves, blotched with white. It is a large tree, and has a very remarkable appearance in contrast with the dark foliage of its neighbours. The whiteness of the leaf is constant, and does not appear to be the effect of disease.

Does this accidental ornament arise from a latent quality in the seed, or has it been produced by circumstances since the young plant came into being? Mr. Jesse describes an oak in Windsor Forest which produces sweet acorns, closely resembling those of the sweet-fruited oaks of Spain and of Arcadia. The quality of Lord Bagot's oaks is recognised, and he is regarded as conferring a benefit on his friends by distributing among them, at the proper season, good oak seed from his famous woods.

A poet of Needwood has named the Swilcar Lawn Oak the forest's "chief mourner." It has certainly survived it like several other great trees which have been allowed to stand here and there in prominent situations. Several acres of the ancient forest have been preserved around it as a specimen of what Needwood was like before the plough invaded it, and its screen of holly may remind a few old men of the jolly days of their youth, of the winter feeding of the deer with the foliage of this hardy evergreen, and of fat bucks in summer, and the romance of stalking them by moonlight with a flint-and-steel gun.

The Cressage Oak, one of the most interesting of historic trees, stands in what was formerly a natural forest, and is now an arable field, half a mile from Cressage in Shropshire, a few fields from the Severn, and within the district comprehended in the Shropshire "All round the Wrekin."

There were very few acorns on the Cressage Oak in the sterile season of 1876, when I visited the immediate neighbourhood and paid my respects to the tree, and they were of the stalked variety. It received the name of Lady Oak in the twelfth century, at the period of the institution of the rosary and of those forms of devotion known as Mariolatry. The original Saxon name of this oak was *Criste-acha* (Christ's Oak), and hence the name of the adjoining village.

The Cressage Oak was probably a sapling when Schobbesburgh—Shrewsbury—stood in the scrub or bush, and of all the oaks that flourished in those woods at that early period this decrepid dotard alone remains. Before a stone had been laid of any of the cathedrals or other churches in Mercia, dedicated to St. Chad, or some other saint, the tree grew in a heathen land, preparing a shade for the congregations of the first Christian missionaries. The reign of Offa extended from 758 to 796, and supposing the Cressage Oak to have been then approaching its maturity of growth at 300 or 400 years, its present age may be about fourteen centuries. It can hardly be less.

Quoting from my account of this tree in the *Gardener's Chronicle*, June 30, 1877, one half only of the Cressage Oak remains, consisting of a massive "skin" of timber 18 in. thick. The circumference of the tree, above the projecting base, would be about 30 ft., if it were complete, the measurement of the remaining half being 14 ft. Part of the standing portion of the shell was so much injured by a fire mischievously lighted many years ago in the hollow trunk, that its envelope of bark is now dead, as well as the crown above it. In the remainder of the crown, life still remains, and a crop of small branches is still fed by the bark below. The tree is in fact a natural pollard with an overhanging rugged crown.

The shape of the outer shell, when complete, was that of a dice box, the overhanging of the upper part being due to the deposit of new material with each successive crop of branches. The crown was originally divided into five parts, each forming a matrix of branches—if that be the proper term—such as repeated lopping or pruning produces. It now carries only fifteen living branches, each from 15 ft. to 20 ft. long. The living portion of the tree is on the south side, where a breadth of 6 ft. of living bark and timber now supports the slender remains of the once magnificent head. At the present time a new growth of wood is taking place in the fragment of the trunk,

and the thick bark covering this part is now bursting and splitting in deep cracks from the expansion of the young wood beneath. A similar growth of a former century has tied and strengthened a portion of the shell which had split from the crown downwards, and would have parted but for the new wood, which has the appearance of having run into the seam-like molten metal, soldering the two parts together.

It would be a bold task to estimate the age of this ancient tree within a few centuries. It obviously belongs to a longer-lived type

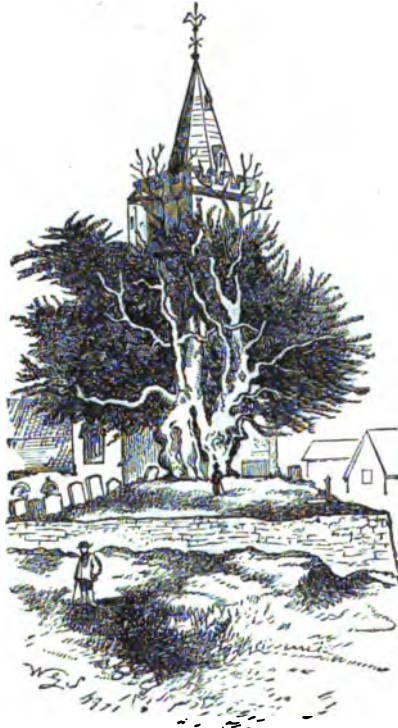


OLD YEW AT STRATHFLEUR ABBEY, NORTH WALES.

than the Venison Tree of Bagot's Park, which is known to have been coeval with the Conquest.

In passing through the country I have had the satisfaction of visiting many historic oaks in England, and some in Wales. The Royal Oak at Boscobel has already been noticed in this *Journal*. Among other oaks of reputation is that in the Holt at Selborne mentioned by the immortal naturalist, Gilbert White. It contained 1,000 cubic feet of timber in the lower part of the trunk only, or that bulky portion which did not exceed fourteen feet from the ground, and

it measured 34 ft. in circumference at seven feet from the ground, a height at which a tree can usually be measured fairly. The Cowthorpe Oak, near Wetherby, Yorkshire, is, or was, the largest oak in England. A few green leaves still fluttered in the living branches of its ruined trunk two years since, when I passed this famous tree. At three feet from the ground its circumference has been reported as 48 ft., but many trees are heavy spurred at the base, and therefore they should always be measured higher up than three feet. The height of the ruin was 84 ft. Mr. Grigor, of Forbes, author of "Arboriculture," visited the Cowthorpe Oak in 1853, and described it



YEW IN STAUNTON CHURCHYARD, WORCESTERSHIRE.

as magnificent, but desecrated by the admission of cattle and pigs within its venerable hollow trunk. A door opens to the interior, and eighty-four school children and their teachers have found standing room in the space within, leaving ample room for several more.

At Ribstone Hall close by, the residence of Mr. J. D. Dent, President of the Royal Agricultural Society, the Ribstone Pippin was raised from seed, the original tree fenced around being now as complete a ruin as the neighbouring oak.

Shelton's Oak, which Owen Glandower climbed during the battle of

Shrewsbury, stands by the roadside between Shrewsbury and Montfort Bridge, where Lord Powis has a good estate provided with cow pastures for the labourers, as every estate with grass land should be. The name of Owen Glendower reminds me of the oak woods of Wales, which clothe the hill-sides as high as the tree level reaches, and particularly around Dolgelly, Merionethshire, where you enter an oak plantation from the street and walk on and on, ascending by the banks of a torrent, noisy amid the boulders, shedding spray on ferns and mosses, everything being most pretty, moist, and green, the oak stems mossed—and mossed by the million, for the trees are small and thickly set, growing smaller as you travel on and up, till at length you emerge from among the trees, and reach the bare summit of one of the peaks below the chief mountain of the district Cadir Idris.

Looking around from this high point you may distinguish Nannau Park, whose owner, Howell Sele, a great Welshman of his day, was killed in his own grounds by Owen Glendower, who pegged him—after the duel, or assassination, whichever it might have been—in the hollow of an oak. The house once occupied by Howell Sele, who I dare say was descended from the celebrated Howell Dha (Howell the Good), stands high up towards the line where timber ceases, the wooded part of the park filling a narrow valley or gorge, down which a stream runs into the river Wnion, the chief among many water channels which unite and sometimes overflow the meadows of Dolgelly. Near the lodge gates some queer-looking, contorted little oaks have spread their roots upon the bare rock, like the yew in the Forest of Dean, and they hold up their arms as if in despair, but there are no trees such as Glendower must have needed for the concealment of his late enemy. Several sorts of trees grow by the stream and road, which you will follow up the slope, the most curious among them being a gnarled pollard oak, bearing on the top of its stunted trunk a large rhododendron, which finds sustenance and a root-hold in a mass of decayed wood. The trees here grow larger, and in a little dell or hollow further on there are three old oaks of size, well sheltered and nicely coated with moss, polypody, and several other ferns. Within a stone's throw a dial marks the spot where Glendower entombed his neighbour. It is said that he boarded up the body carefully, and left it so well concealed that it was only discovered years afterwards, a skeleton.

The lapse of four hundred years affects the aspect of a crime much as it does the appearance of a red brick wall, and we are led to admire what must once have seemed atrocious.

It is a pleasant short walk from Dolgelly to the dell, and the shocking incident I have noticed adds to its attractiveness.

The two other engravings in this article represent trees which need no special description since their appearance sufficiently explains them. They are taken from a number of yews sketched by Mr. Lees for the *Gardeners' Chronicle*. One is a "curious" yew with a divided trunk, the other an "historic" yew in a village churchyard.

H. E.

(To be continued).

FOREST FIRES, AND HOW TO PREVENT THEM.

IN referring to Mr. Heather's queries in your last issue regarding this subject, I may remark that knowing how very inflammable dry heather is, it might be at first sight a very alarming thing for a proprietor of extensive hill-pasture and fine grouse shooting to see a railway train passing through it, especially at night, vomiting out millions of sparks ready to burn not only all vegetation alongside the line, but for hundreds of yards back from it; and the proprietor, who, like Mr. Heather, has the courage to spend his money in planting trees along so dangerous a source of fire, might well be almost thought too daring.

We need not therefore be surprised to find some of Mr. Heather's friends telling him he committed a great mistake in not leaving a margin of fifty yards broad, to be always kept as bare from grass and heather as fire could make it, in order to protect all the rest from fire, although this could not be done without the expenditure of a considerable sum of money; nor need we feel surprised, though they advised him to be at the expense of lifting all his thriving young trees close to the railway, and plant them fifty yards back, so as to be beyond the reach of fire. But as Mr. Heather wants some information about this through your columns before adopting his friend's counsels I, for one, will be glad to give him my thoughts about it.

If Mr. Heather's friends examined the sparks from the engine, which they saw falling to the ground as it hastened along its iron track, they would find that, with very few exceptions, they fell cold and harmless on to the ground, and that out of those exceptions, the numbers hot enough to be capable of igniting dry heather were very few indeed, so much so, that I would be glad to know the facts which would lead any one justly to the conclusion that sparks from engines, as they are now constructed, would, in any railway passing through, say twenty miles of a hill pasture for the last ten or twenty years, with heather-burning going on at the same average slow rate per annum, due entirely to sparks from these engines, at this rate, we would ask, would it be safe to calculate less than one thousand years for the heather all along both sides of the line to be once burnt? If

not, where can the serious cause of alarm be? No doubt sparks from engines have set fire to heather and have destroyed many thriving young trees before now; and it is equally true that the best-managed railway had some breakdowns, causing serious losses, but when these losses were measured by railway gains they sunk into comparative insignificance, just as the loss of a few trees will if fairly measured by the gains arising from trees being planted judiciously along railways through hill pasture.

Mr. Heather tells us his young trees planted close up to the railway are growing very well, just as they were planted, and so is the heather among them, and with the exception of a few yards burnt last spring from an engine spark, no fire has yet appeared near them. We are not told their size, but they must be small, as his friends advised him to plant them back fifty yards. Let us suppose his plants stand 4 ft. apart, it may cost about two shillings per running yard of each side of the railway, to plant them back, or about £350 per railway mile; whereas if he leaves them to take their chance it is a most likely thing for them to grow for a few years longer without being molested by fire; if they are only about 4 ft. apart, although the heather is growing so well amongst them at present, it will soon begin to decay, partly in consequence of the deep shade caused by the crowding of the tree tops, and partly by foliage falling upon it, and the tree tops will be so high above the heather that should all the ground be burnt black the trees would be so little harmed that at 150 yards away it might not be observed that fire had been near them. I have seen more than one small spot of trees about 2 ft. high scorched to death in heather about 1 ft. high, burnt by a spark from a passing engine, and also a small spot of a similar description of heather, with Scotch fir of 8 to 12 ft. high growing among it burnt in a similar manner. In this case, the trees were a little scorched, but nothing serious. The same thing cannot happen again, because the trees can easily be kept too close to admit of heather growing there any more. If Mr. Heather's friends are disposed to doubt my statements let them have their theories tested by the following simple experiment.

A pine wood is supposed to be the most liable of all kinds to destruction by fire because of the resin and turpentine it contains. Let our experiment be therefore tried upon a Scotch fir tree. It is 12 ft. high and well clad with live branches. It is surrounded with thick rank heather about a foot high, and is as dry as can be in April weather. In order to have the fire strictly confined within the limits of our experiment, the heather is all carefully pulled up and cleared away, leaving a circle of 4 ft. diameter, one-third of the height of the tree in which it forms the centre. Let the heather now be kindled and all burnt. We will now leave this tree, with its vitality

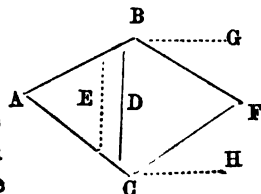
somewhat impaired, to Nature's tender nursing until autumn, and pass on to try another experiment.

Here we have an isolated clump of trees resembling as near as possible the tree we have just ceased operating upon. They stand an average distance apart of about one-third of their height. We pull the heather from all round this clump to within one-sixth of the average height of each tree, measuring from the stem outwards, and clear all away beyond the reach of fire. We now kindle a fire of coal in a portable grate at a safe distance off. When this is burnt into a state something similar to the largest cinders that possibly can come from an engine's smoke stalk, let us with a small shovel throw them against the tops of the trees, and in a manner as much as possible to resemble sparks thrown on by a passing engine, then examine the extent of the injury thus done, if any, and we will find that each of these cinders took such a time falling, first on one branch, then on to another, until by the time it reached the ground it could be easily held in the bare hand. Let us now kindle another similar fire and throw its cinders in a similar manner first up in the air, then let them fall in the adjoining long heather, and we will find that the cinders we may now pick up are of a very different temperature, and might under the most favourable circumstances perhaps kindle a fire, thus proving beyond a doubt that well managed plantations alongside a railway, in place of being an aid to, is a decided protection against fire.

The season's growth is now over. It is autumn. Let us examine the state of the tree around which the heather was burnt. We may find the lower branches, which were green before, being scorched by fire, now standing out bare, with arms minus all green. The bark on the stem and on the lower branches is somewhat charred, but all the upper parts of the tree are as fresh as if a fire had not been within a mile of them. Let us examine the extent of the charring, and we shall find it limited to only two or three layers of the old dead corky bark, with all the live bark within this as fresh as ever, proving what a bad conductor of heat bark is, and especially if somewhat damp—a state in which it unavoidably must be under so much shade; but still, it must be admitted that it is quite possible for an engine spark to kindle dry heather into flames, although it is in the last degree improbable, at least to such an extent as to be worthy of any serious apprehension.

We have seen that heather and dry natural grasses are much more liable to be destroyed by fire than trees 8 to 12 ft. high, and as it might be a serious loss to have these substances burnt just where they were most needed, it would be an advantage to have risks of fires minimized as much as possible, if this could be done without

extra cost, and this we believe possible if done in the following manner. Now that a line of railway has passed through his hill pasture, Mr. Heather will permit me to suggest that the best way to improve his hill pasture, and his shootings as well, and to impart a pleasing picturesque appearance to the district, is to plant large clumps and belts on both sides of the railway, care being taken to have it done with a proper regard to usefulness as well as beauty. A fine healthy tree, no matter what sort it is, is something pleasing to look at where none exists. Let the trees that are planted, therefore be such as suit the soil, climate, and exposure. Let us suppose the crop to consist of Scotch fir for a base, with irregular clumps of birch, with its light green colour in summer, and its dark brown in winter, giving the passers by an occasional glimpse of its silvery bark; larch, with its conical shape and light green foliage in summer, much resembling in colour that of the birch, and its light colour of bark in winter; the Norway maple, with its beautiful broad green leaf in summer, which in autumn blends into almost every variety of shade. We need not here mention the many more trees equally worthy of notice, as these will no doubt readily occur to readers. Where this was done, under proper management, draining, pruning, &c., could be carried on in the driest time of the year, and two or more men could be employed at these jobs, and at the same time be on the look-out for fires, and that without incurring any extra cost to the plantation; but as it is possible for a spark from a passing engine to start a fire which, with a fine light breeze, might be fanned into a formidable fire, although (as we have seen), it is a very unlikely thing to happen. The best preparation is to have some bushy spruce branches, say about the thickness of an axe handle by 6 ft. long, $4\frac{1}{2}$ ft. of the thick end of this to be cleared of small branches, so as to form a handle; then leave $1\frac{1}{2}$ ft. at the small end bushy, and if not sufficiently so tie other small twigs on to it to make it sufficient. All other advantages being now equal in favour of a fire, let us suppose a spark is dropped in heather at A, its tendency is to extend from its starting point A, towards D, F, and to expand towards B, C, because, the point A radiates its heat in every direction, but much more so towards D than B, C, because the wind blows in this direction; it therefore follows that the fire gradually expands towards C, B, as well as goes on towards D, F. The rear line of fire at the time the men began to extinguish it, let us suppose, is at H, and the front at D. The proper place to begin to put out the fire is at C and B, the men using the fire brushes, as we call them, sharp and quick in striking down the flame, not raising the bushy part of the



brush higher than the shoulder, the object being to stamp out the flame and to bring it as quickly as possible within the lines C, B, F. I have seen people who knew nothing about fire rushing into it on the line E, over which the fire was just passing; and others into it on the line D, near the centre of which the fire was at its hottest, and where, under ordinary circumstances, they would soon be suffocated with smoke and scorched with heat, and entirely neglected checking the gradual extension of its boundary, where the greatest danger really lay and where their exertions could tell best. I have also seen men use the brushes in such a way as to throw as many sparks behind their backs as to ignite three times as much heather as they extinguished. We may here remark that those who consider it an important advantage to have heather burnt in rotation may easily have it done in the following manner:—It is intended to burn a strip 25 yards broad in every 200 yards long of a heathy moor, thereby having the heather burnt in rotation every eight years. All that has to be done more than we have described is just to line it off into parallel stripes on the lines G, H, and burn accordingly.

The cost of fencing plantations is an item of expenditure to which too little attention is often paid in laying off the outlines of young plantations. For example, it is proposed to run a belt of only 35 yards broad by 1,400 yards long along the brow of a hill the area of which would be 10 acres as near as possible, requiring 2,870 yards of fencing, say at 1s., would be £143 10s. or £14 3s. per acre for fencing alone, whereas the same area could be enclosed within 242 yards long by 200 yards broad, and could be fenced with 884 yards, or at a cost of £44 4s. at 1s. per yard, £4 8s. per acre; as the area increases providing it is as near as possible to a square or circular shape, the cost of fencing per acre decreases; but in planting alongside a railway the cost is very much lessened, as the railway fence can always be got to form its own part of the plantation fence, costing nothing to the proprietors of the land which is to be planted, and where the railway forms a deep curve a proprietor might have only to fence the half of a large plantation, the railway fence forming the other half.

Not only would plantations alongside railways be a protection against fire under proper management, as we have seen, but shelter could be thus cheaply got for the pastoral and sporting tenants' stock. In places liable to railway snow-blocks, it would shelter the snow from the drifting influence of the wind and prevent it from filling up cuttings. The thinnings of these plantations could be useful for railway fencing purposes, and for sleepers when full grown, and being near the railway their produce could be cheaply sent to market.

Mr. Heather is further advised by his friends to destroy all his good game cover in a mixed plantation of coniferæ and hardwood, with trees

from 15 to 40 ft. high, which runs along a public road, by cutting away whin, underwood, &c., in case of fires, because a neighbouring proprietor got some trees destroyed in consequence of, as it was supposed, a pipe-light having been carelessly thrown away; and as an additional precaution he is advised to cut all the trees growing in a breadth of 30 ft. 100 yards in from the public road, and this pass or avenue to run along parallel to the public road the whole length of the plantation.

Assuming the plantation to be 200 yards broad, this 30 ft. or 10 yards is 5 per cent. of the entire area of the plantation, that cost the proprietor at some time so much care and trouble, entirely cut away, and that through an imaginary fear of a fire being accidentally kindled, and destroying the whole plantation, which might be worth £80 per acre, if its prospective value be added to its present value, thus reducing the value of the plantation from £80 per acre to £76, and along with this loss per acre there is an extra and a totally unnecessary expense of clearing away all the heather and fog to be incurred, and the keeping of it bare ever after. Mr. Heather's friends may endeavour to show that they mean the 30 ft. to be from the stem of one tree across to that of the other, that the tops might in time overlap the 30 ft. path thus made, and that after all it might only be equivalent to giving the plantation rather a severe thinning now to serve an important end. There might be some show of reason in putting it in this light had this path been formed at the time the plantation was first made, and the trees put exactly in line along both sides of this avenue; but in this plantation of Mr. Heather's it is quite possible the trees are far enough apart already, and that when the proposed avenue is cut away, in place of 30 ft. apart, many of the nearest trees may be 50 ft. apart from each other.

But wind does not always blow across roads, and may blow fires towards all the points of the compass. At best, therefore, these avenues could only be of use if the fire was blown from the road inwards. We may be told of immense forest fires having taken place many times in the American pine forests, and as these may have been due partly to causes which may lead to the same results at home, we may mention that if all dead branches are pruned off trees, and underwood, &c., not allowed to grow above $1\frac{1}{2}$ to 3 ft. high, according to the height of the trees surrounded by them, should a spark of fire take effect all it has to burn is too damp (at least in this country) to leave much force of heat to do any injury. If Mr. Heather keeps his trees as close or crowded as possible consistent with growing the heaviest and best crop of trees per acre, his ground will be too damp and too bare for any fire to do serious injury. All dead wood should be kept well pruned close to the trunks as a protection against fires,

and as trees have to be pruned of their dead wood when felled before being sent to market, just as well do it when the tree is standing as when felled : and besides, all those wounds heal over, and the tree so pruned will produce a cleaner and better class of timber than by leaving pruning entirely to Nature,

D. MCCORQUODALE.

Dunrobin. Golepie, N.B.



THE BEAUTIES OF BRITISH TREES.

(Continued from page 702.)

5. THE ASPEN (*Populus tremula*).—Since the chances of an alphabetical arrangement have brought us thus early to a second species of the small genus *Populus*, it may be well by way of preface to give a brief synoptical diagnosis of the distinctive points of each of our five common forms. The two genera *Salix* (the willows) and *Populus* (the poplars) form by themselves the natural order *Salicaceæ*, all of which are trees with alternate leaves, furnished with stipules, and with their flowers in conspicuous catkins, the two sexes being on different plants (dioecious), and the perianth being replaced by simple scales. The female flower consists of a solitary one-chambered ovary, containing many ovules. The willows have usually narrow leaves, erect catkins and scales, which, though hairy, are not notched. The poplars, on the other hand, have broad leaves, drooping catkins, and scales slashed into several lobes. Both male and female flowers are enclosed in a little cup-shaped “disk” in the axil of the scale. Our five common poplars are the Abele, or white poplar (*P. alba*), the grey poplar (*P. canescens*), the aspen (*P. tremula*), the black poplar (*P. nigra*), and the Lombardy poplar (*P. fastigata*). Of these the two first, perhaps, should be classed under one species; the two last, neither of which are truly indigenous, should certainly be so treated. Perhaps the best point of difference is the stigma; but the lover of trees who may be but a tyro in botany will be glad of other means of recognising the objects of his attention. The three first forms agree in having downy shoots, dense female catkins, scales fringed with hairs, and stamens varying in number from four to twelve in each floret. They have, therefore, been grouped in a section named *Leuce*. The two last, on the other hand, have their young shoots smooth, their female catkins lax, scales almost smooth, and stamens more than twelve in number. They belong to the section *Aigeiros*. It will, perhaps, be clearer to give these characters and those distinguishing each species in a tabular form.

POPULUS. Section 1, LEUCE.—Shoots downy; female catkins dense; scales ciliate; stamens 4—12.

1. *Alba*, white poplar, Abele. Leaves on the suckers lobed; those on the branches roundly heart-shaped, slightly lobed; white and cottony on under surface, stigmas 2, bifid, linear, cross-like, yellow.

2. *Canescens*, grey poplar. Leaves on the suckers angled and toothed, those on the branches roundly heart-shaped; hoary or smooth on under surface; stigmas 2, 3, 4-lobed, wedge-shaped, purple; buds downy.

3. *Tremula*, aspen. Leaves on very long stalks, those on the suckers heart-shaped, pointed, not toothed; those on the branches rounded, with in-curved teeth, silky or smooth on under surface; stigmas 2, bifid erect, buds slightly viscid.

Section 2. AIGEIOS.—Shoots smooth; female catkins lax; scales nearly smooth; stamens 12—20.

4. *Nigra*, black poplar. Leaves on long stalks; when young rhombic in form, silky on the under surface, and ciliate; when old, more rounded, finely-toothed, smooth; stigmas 2, roundish, 2-lobed; buds viscid, no suckers.

5. *Fastigata*, Lombardy poplar. Differs from the last mainly in its erect or “fastigiate” mode of branching; suckers.

Having thus shown how the aspen may be distinguished from its congeners, we can now enter more into detail as to its own features of beauty. It is not usually a large tree, nor is it long-lived. It is not of any great value as timber. In mediæval times it was used for making arrows, and its use for other purposes strictly prohibited by law. Spenser speaks of it as “the aspine good for staves,” and it is still used for wall-panels, for clogs, and for gunpowder-charcoal. It is chiefly, however, for the grace of its grey bark and rustling leaves that the tree is valuable in our marshy woods or moist hedgerows. This rustling of the leaves, which are scarcely ever still even in the stillest air, is the most striking feature of the tree, and the point of most allusions to it in our literature. In early English times it bore the name of “quick-beam,” or live-tree. Turner, the father of English botany, simply mentions its name, giving the Greek names *Leuce* and *Argeiros* (*sic*) for the two most marked forms of the group. The grace of the whole tree would seem more than once to have suggested the ladies to writers on the aspen, though their remarks are hardly complimentary. Thus, Gerard says of it, “may also be called Tremble, after the French name, considering it is the matter whereof women’s tongues were made (as the poets and some others report), which seldom cease wagging,” whilst the address to woman, in “Mar-mion,” as

“—— variable as the shade
By the light-quivering aspen made,”

is better known. Far more poetically striking is the old Scotch and English legend on the matter, so beautifully told by Mrs. Hemans :—

“ ——— a cause more deep,
 More solemn far, the rustic doth assign
 To the strange restlessness of those wan leaves ;
 The cross, he deems, the blessed cross, whereon
 The meek Redeemer bowed His head to death,
 Was formed of aspen wood ; and since that hour
 Through all its race the pale tree hath sent down
 A thrilling consciousness, a secret awe,
 Making them tremulous, when not a breeze
 Disturbs the airy thistle-down, or shakes
 The light lines of the shining gossamer.”

Scientifically, this quivering is explained by the length of the slender leaf-stalk and its lateral compression, whilst the use of it is probably to aid in the pumping process by which moisture travels rapidly up from the roots to be transpired by the leaves. The large drooping catkins appear in April, before the foliage, and the male ones, having fulfilled the object of their existence by discharging their pollen, strew the ground after a spring breeze. The tree gains in variety of colour, though its rustling gives it then even a more melancholy effect than ever, when, “with his gold hand gilding the falling leaf,” autumn spreads its badge of splendid decay over each leaf in succession. From its more spreading habit the aspen is less stiff than the Lombardy poplar, and, though useful in the marshy wood along with its congener, the abele, deserves a place in the foreground of the copse bordering a lake or stream. A row of these trees would stand up well in such a situation, relieving the heavy foliage of the lower alders or rhododendrons, and, as it were, reflecting in their quivering leaves the ripple of the water at their feet.

6. The WHITE BEAM TREE (*Pyrus aria*).—Of our British trees, some forty-five in number, about one-fifth belong to the rose tribe, and these to three genera, the hawthorn to *Crataegus*, the plums and cherries to *Prunus*, and the apple, the pear, the medlar, the service, the rowan, and the white beam to the genus *Pyrus*. This genus is characterized by its fruit, which is fleshy, consists of from two to five, generally five, carpels, and contains two seeds, or the rudiments of two seeds, in each of its chambers, these chambers, or “core,” being of a parchment-like or cartilaginous texture. This is its general diagnosis, but of the two ovules in each chamber of the ovary, only one in many cases forms a seed ; in the medlar the core is bony, as in the hawthorn, and in that section of the genus known as *Sorbus* the fruit sometimes becomes divided into as many as eight chambers. There are three of these sections, or sub-genera :—*Pyrus* proper, with flowers in simple cymes and large five-chambered fruits, including

the apple and the pear; *Mespilus*, the medlar, with solitary flowers and large five-chambered fruits with a bony core; and *Sorbus*, with flowers in compound cymes, forming flat-topped or "corymbose" clusters. To this section *Sorbus* belong the service, rowan, and white beam, which are distinguished by minor characters of the leaves and fruit. The rowan has large leaves consisting of six or eight pairs of distinct narrow leaflets, with hairs along the veins of their under-surfaces, which are lighter green than the upper; the service has egg-shaped, simple leaves, with from six to ten triangular lobings, which are downy on the under-surface when young, but smooth when mature; the white beam has leaves intermediate and variable in form, but white and generally very downy on their lower surfaces. The fruit of the rowan is scarlet; that of the service is a mottled greenish-brown, the "chequers" of some country markets; whilst that of the white beam tree is at first pubescent and dusky-brown, but finally becomes red or scarlet, though slightly mottled. Botanists have distinguished four varieties or sub-species of the small, bushy-growing trees, which we tautologically call the beam tree, for of course its name is but the German *baum*. It is emphatically the white tree, the tree with the silver leaves. These varieties mainly differ in the lobing of their leaves; but one, the *Pyrus intermedia*, of Ehrhart, or *Pyrus scandica* of Professor Babington, has leaves that are grey instead of white below; and another, the *Pyrus fennica* of Linnæus, or *Pyrus pinnatifida* of Sir J. E. Smith, has very distinctly and deeply-lobed leaves and scarlet berries. The latter is a native of the Isle of Arran, the former occurs in the south of England. Whichever form we may see, it will be gay in May and June with its loose clusters of white flowers, each of the blossoms being about half an inch across and resembling those of the Guelder rose. In autumn it will be equally attractive with its bunches of brilliant fruit, the joy of the race of birds. From spring to autumn its silvery foliage will glitter in the sunbeams as it is stirred by the breeze, so that it has a most pleasing effect as it overhangs some limestone cliff or quarry. An exposure of rock, crowned with fine beeches and yews, and festooned with traveller's joy, with one or two bushy trees of the white beam on its ledges, would form a picturesque feature on the line where wild garden passes into shrubbery.

G. S. BOULGER.

(To be continued).



*REPORT ON A VISIT TO THE ENGLISH AND SCOTCH
FORESTS BY THE PROFESSORS AND STUDENTS FROM
NANCY FOREST SCHOOL.*

By M. BOPPE, INSPECTOR OF FRENCH FORESTS.

THE total area of Scotland is about 20,000,000 acres, hardly one quarter of which may be reckoned as arable, forest, or pasture land, the remainder being occupied by the lakes, rivers, peat-mosses, moorlands, bare rocks and mountains. It is surprising then to find that against such a vast area of uncultivated ground only 734,490 acres, according to the official returns of 1872, are classed as woodlands.

There is every reason to suppose that, at a remote period, both the Highlands and Lowlands of Scotland were covered by dense forests, which were successively destroyed by the fire and steel of conquerors, and during the anarchy existing under the old feudal system, as well as by the fearful storms which at almost regular intervals sweep over certain districts. So complete, indeed, was this devastation, that, in 1707, all that remained of the grand old Caledonian forests were a few shreds, and those in a most deplorable condition.

From the union of the two kingdoms dates a period of political calm, during which, time and the marvellous timber-producing properties of the soil and climate would have done much to repair the ruin, had not the sheep, arch-enemy of all forest vegetation, been allowed to retain his footing in the forests.

The noblemen and great landed proprietors of Scotland at last felt the necessity of doing something to restore the parks and woodlands in the immediate vicinity of their mansions, and by the introduction of plantations to vary the sombre monotony of the boundless heather. It was also necessary on these bare moors, where grazing and shooting form the main sources of revenue, to furnish shelter for the cattle, sheep, and deer. Their example was soon followed by the smaller proprietors, and, under the wise patronage of the "Select Society" of Edinburgh, founded in 1754, the area of forest land augmented rapidly, so that in 1812 Scotland possessed, besides 500,000 acres of natural forest, about 400,000 acres of plantations.

The year 1815 marks a pause in the work of replanting, which had been so vigorously begun. We do not pretend to enter here into the various causes which led to this economical phenomenon, but it is certain that the laws of 1636, on the constitution of landed properties in Scotland, exercised a baneful influence on the rational cultivation of the soil. The Scottish Parliament in vain sought to counteract the Draconian regulations of these laws, the principal effect of which was to cause the proprietors to look on themselves as only life tenants of the entailed estates, and consequently to take but a very slight interest in the improvement of the soil and the augmentation of its pecuniary value.

From the moment the planting ceased the area of woodland diminished, and necessarily so, for in any forest where sheep have free entrance the removal of a tree, whether by the axe of the woodcutter or by the violence of the wind, causes an empty space which can only be refilled by resorting to artificial means. It is thus that the returns of 1872, as compared with those of 1812, show a diminution of some 200,000 acres in the area of forest

land in Scotland. Whether it was a portion of the old natural forests or the newly planted ones that had disappeared during this period of sixty years, the documents extant do not show. There is, however, good reason to suppose that both suffered equally in this respect. For, on the one hand, the construction of the Highland Railway necessitated the employment of a large number of sleepers, which could be procured from the woods of from fifty to eighty years of age, along the line of route; and, on the other hand, the increased facilities of transport, and the scarcity of wood in England, gave an unexpected value to certain tracts covered with birch, and so tempted many of the proprietors to cut down the old forests composed of this species.

In 1870, the work of replanting seems to have recommenced with increased ardour, and on all sides may be seen young plantations vigorously striving to fill up the gap which separates them from those of half a century's standing.

Such, in a few words, is a brief outline of the history of the forests which we have had the good fortune to visit, under the guidance of our excellent friend Colonel Pearson. Thanks to the kind forethought of the authorities at the India Office, and to the hearty welcome which we everywhere received from the great landowners and their agents, our flying visit was accomplished in a most agreeable and instructive manner. We eagerly seize this opportunity of offering to all concerned with it our sincere and hearty thanks. We would fain also express to the eminent personages who did us the honour of receiving us so graciously, that we accepted their kind marks of attention as being addressed, not only to ourselves, but also to the French Government and the Forest School at Nancy, which year by year, since 1868, has offered to the English students, without any distinction of nationality, the advantages of a forest education.

Before proceeding to a description of our tour, it will perhaps render the narrative more intelligible if we give a brief sketch of the country we visited, its general aspect, and natural resources.

From a forest point of view, Scotland may be divided into two distinct regions, by an imaginary line drawn from Perth, on the Firth of Tay, to Greenock, on the estuary of the Clyde. To the south of this line we find the Lowlands, a country which agriculture and manufactures have combined to render one of the richest in the world. The economic situation of this wealthy district is as prosperous as possible, and the thoroughly developed system of high farming which is there employed leaves but little room for forest cultivation. The Lowlands are bounded on the south by the Cheviot Hills, which afford excellent sheep walks. To the north of this line lie the Highlands, intersected in all directions by the far-stretching chain of the Grampians, whose rugged nature gives to the country an aspect not unlike that of the western coast of the Scandinavian peninsula. One would imagine that at some earlier geological period immense polar glaciers, flowing over the solidified North Sea, traversed the whole of the north of Scotland, polishing on their way the mountain sides, excavating the lake beds, and breaking off abruptly the cliffs surrounding the coast. The culture of cereals is here confined to a few favoured localities, situated near the mouths of the rivers or on the low-lying ground bordering the sea, where the glacial deposits constitute an excellent soil. The rest of the country is wholly occupied by water and heather, and thus out of the 13,000,000 acres which this region comprises, only 1,600,000 (or less than one-eighth) are classed as arable, forest, and pasture lands. If out of the remaining 11,000,000 acres of unproductive land we allow a half for the lakes, bare ridges, and sterile mountain tops, there will still remain 5,000,000 acres capable of furnishing

valuable timber forests. Here then is a problem for British economists, and a vast field for enterprise and capital.

In the Highlands, to which we principally directed our attention, the districts around Perth, Elgin, and Inverness are those in which the most extensive forest are to be found. These three counties together contain about 247,700 acres of forest, and being well served by the Highland Railway system, these are easier to visit than any of the other Scotch forests. Starting from Perth, we made our way across the Highlands, visiting *en route* the towns of Dunkeld, Blair Athole, Aviemore, Grantown, Forres, Inverness, and Beaulieu. We were thus enabled, not only to make an inspection of some of the finest forests in Scotland, but at the same time to obtain a fair idea of the general aspect of the country. The punctuality and precision, so thoroughly characteristic of Englishmen, with which all the details of our journey were arranged by Colonel Pearson, added to the hearty reception we met with at every turn, enabled us, in the short time at our disposal, to thoroughly inspect more than 100,000 acres of every description of forest, under ever varying physical and geological conditions. Everywhere, both at a few feet above the sea level and on the sides of mountains at a height of 2,500 feet, in the sands of Forres and in the schists, red sandstones, granites, and gneiss of the interior, we were struck by the wonderful aptitude of the soil to forest vegetation, favoured as it is by a regular climate and the constant humidity of the atmosphere.

In the low-lying districts, at an altitude of from 250 to 300 feet, we found growing, both singly along the roadside and collectively in the forests, magnificent specimens of oak, maple, elm, ash, beech, and lime, which, by the vigour of their growth and the rich colouring of their foliage, bore testimony to the favourable conditions of soil and climate under which they grew. We were struck with admiration in beholding the colossal trees of every description forming the avenues at Scone, Dunkeld, Blair Athole, and Darnaway. It was near the first of these places that the venerable father of Scotch forestry, Mr. McCorquodale, showed us, with legitimate pride, a small oak forest of about 400 acres, which, 60 years before, he had himself assisted to plant. In this forest, the trees were standing about 24 to 30 feet apart, and their diameters measured from 12 to 18 inches, whilst their magnificent tops formed a perfect canopy of leaves above the bright rhododendrons, in which colonies of young pheasants found a home. In the spring-time this ought indeed to be a fairy-like spot. But, independently of this undergrowth, which is, after all, only suitable for the wealthy few, we cannot help thinking that a more careful study of this superb forest would go far towards clearing up some of the doubts which have always surrounded the difficult question of the cultivation of forests composed solely of oak.

The mountain vegetation commences at about 400 feet above the level of the sea; beyond this we find ourselves in the domains of the Scotch fir, the larch, and the birch.

In selecting the Scotch fir as the tree to be cultivated before all others in these regions, the promoters of forest plantation during the latter half of the past century, showed no mean proof of their thorough appreciation of the natural requirements of the soil and climate of the Highlands, for not only have they ensured the success of their operations, but they have traced out the best line of action for their successors.

Equally fortunate were they in their endeavour to introduce the larch into Scotland; transported from the ice-bound summits of the Alps to a country where the climate is tempered by the softening influence of the

Gulf Stream, this tree does not appear to have suffered to any material extent by so sudden a change of latitude.

When, in 1737, the Duke of Athole brought home, amongst his baggage, as a kind of remembrance of his travels in the Tyrol, the seeds which were sown in his park, and from which sprung the first larches in Scotland, he rendered a most valuable service to his country.

From a forest point of view, the results obtained by the cultivation of these two species (Scotch fir and larch), are truly marvellous. Anyone who has seen the beautiful larch forests planted in 1815 on the banks of Loch Ortie and the vast stretches of Scotch fir covering the flanks of the Bruarwood mountain, cannot fail to admit that the question of the replanting of the Scotch Highlands is practically answered.

The absence of the beech from all the forests of any standing is easily accounted for by the fact that it is only quite recently that the timber of this tree has become of any value for industrial purposes. For many cultural reasons, however, the beech is a tree of the highest importance, and we should strongly recommend its introduction into all future plantations, and it is, moreover, as much indigenous as the Scotch fir and birch. In many cases even it might with great advantage be substituted for this latter, or, better still, mixed with it.

Considering, too, the wonderful success that has attended the introduction of the larch, we think that a similar attempt might be made to acclimatise the *Pinus montana* in the peat mosses. These immense sponges, so to speak, which cover sometimes entire districts, discharge their dark-coloured waters into all the streams, and give to the lakes and rivers of Scotland that sombre tint which is so peculiar to them. The fuel which they afford is of very second-rate quality, and supposing that half the surface was converted into plantations, there would still be enough peat left to keep going all the whisky stills on the country side.

As foresters of the Continental school, accustomed to live among forests, regularly managed, and having for their sole object the production of timber, we had no little difficulty in understanding the widely different motives which actuate forest cultivation in this country. Everywhere we found the forests fenced in on all sides with walls and hedges; and, as a matter of fact, the forester or agent generally carries the keys of the gates in his pocket. We learnt that these costly enclosures were erected, not for the purpose of keeping out the cattle and deer, as in the Jura, but for the purpose of keeping them in; it appeared to us like shutting up the wolf in the sheep fold.

We were also struck by the monotonous regularity in the height and age of the trees, unmistakeable sign of their artificial origin and want of methodical management. The forest, here left to its own devices, continues growing just as the hand of man has planted it; the undergrowth is constantly grazed down by the sheep and cattle, and nature, in spite of the immense resources at her disposal, is quite powerless to modify the work of the planter, or repair the errors committed by woodcutters.

When, under such circumstances, the time arrives for the trees to be cut down, or should they be uprooted by a hurricane, the forest disappears in its entirety, owing to the total want of young growth which is necessary as a link between the old forest and the new one which ought to be created. Such, at least, appears to us to be the case in all the forests that we visited in the valley of the Tay and its tributaries, and further north, near the foot of Cairngorm.

Nor far from a mansion to which are attached some of the pleasantest recollections of our tour, we saw the remains of a noble forest, which some

20 years ago had been cut down and converted into railway sleepers. The sight of the huge stumps, blackened by time, with their gnarled roots twisting themselves over the ground, gave us the idea of some vast charnel house. This scene of utter ruin was indeed a sad spectacle, though the present proprietor is doing his best to again cover his estate with timber; with a better system he might have been spared both time and expense. It is easy in Scotland to perpetuate a forest by natural means, and of this a practical proof was given us in two forests which we visited; the one near Grantown, in Strathspey, the other at Beaully. In these the results obtained under the skilful and intelligent direction of the gentlemen who manage these forests for their employers form a striking example of what may be done in the way of reproducing forests by natural means. In fact, nothing had been neglected which even the most critical forester could desire; the gradation of age was here complete, and the reservation of specially vigorous trees, of known pedigree, duly carried out.

The *modus operandi* here pursued consists simply in the exclusion of the sheep and deer, in the judicious thinning out of the growing crop, and in the removal of the mature seed-bearing trees, by successive fellings, as the young forest grows up and acquires more vigour.

Nevertheless, we would not have it be supposed that the sheep need be absolutely debarred from all grazing in the forest; it is only in those portions where the undergrowth is very young that the damage caused is irreparable. We feel convinced that if, every year, certain portions of the forest best capable of supporting it were marked out for grazing, the quality of the pasturage would be greatly improved, and the heather would quickly disappear under the cover.

It is an established fact, beyond all contradiction, that on any soil, whatever its geological origin, a complete covering of forest vegetation will kill the heather as soon as the trees reach the age between 30 and 40 years. Suppose then that 120 years be the term fixed for the existence of the trees in any portion of the forest, and that the trees of 100 years of age and over are reserved, there would still be one half of the forest always open to the sheep, and the other closed. But, at the same time, it is certain that this open half, owing to its superior quality, will furnish pasturage for at least twice as many head of cattle or sheep as the same quantity of moorland.

Although, under ordinary conditions, the regeneration of a forest will be sufficiently assured by the exercise of a discreet control over the grazing, something more than this must be done if it is desired to turn the land to the best possible account. It is therefore a matter of regret that nothing has yet been done to place forest management in Scotland on a sound economic basis.

The productive powers of the soil and of the climate have been made use of by able and intelligent planters, who have thereby enabled nature herself to accumulate a considerable store of timber; but all this wealth is exposed to the carelessness of some and to the ignorance of others, until the hand of a forester manages it properly and places it on the only sound economic principle of all agricultural and forest property—a *constant annual revenue and a constant improvement in production*.

It would certainly not be fair to hold the Scotch foresters responsible for the present regrettable state of affairs, for, though they have for the most part admitted the inefficacy of the present system, they are powerless to effect any improvement so long as the landowners and general public have not learnt to appreciate the manifold advantages to be derived from a regular and methodical management. They have to struggle against many adverse

interests and hindrances, such as grazing and shooting interests, questions of routine, pecuniary exigencies, and the fancies of sportsmen from all parts of the world.*

In wishing Scotland, then, a hearty farewell, we venture to predict for her forests a great and prosperous future. It does not need that one should be a very great prophet to predict this for a country where the oak and beech, the Scotch fir and larch, flourish with equal vigour, and where the *Abies Douglasii*, *Abies nobilis*, and *Abies Menziesii*, the *Sequoia*, and the cedar, form mighty trees, in company with the *Araucaria* and various exotic shrubs, which only languish miserably under the climate of Paris.

Before leaving this country, however, we would fain add a word of advice, for the moment appears to us a propitious one for deciding on the future welfare of the forests, which, owing to the rapidly increasing value of timber, runs great risk of being compromised. Ordinary fir timber now fetches 8d. per cubic foot, larch is worth nearly double that amount. We ourselves visited a forest of Scotch fir which, at this rate, would be worth £120 an acre, and another of larch worth considerably more; whilst a third forest of 1,600 acres, composed of Scotch fir, was purchased a few years ago for £52,000, or only about £30 an acre. The plantations on the Culbin Sands, near Forres, would readily find buyers at £50 an acre at the age of forty-five to fifty years. The very day we were at Grantown, the agent for the Strathspey forests concluded a bargain to furnish birchwood to the amount of £2,000.

All these figures are fraught with extreme significance for the future, and the large forest owners of Scotland will do well to pause before allowing their forests to be "overworked." We would recall to their recollection the old fable of the goose that laid the golden eggs.

No doubt, people are often frightened by the long names and big words they find in treatises on scientific forest management, but they may very well neglect the text if only they will adopt some of the principles which they contain. Let the owner of a forest, after having made a careful and detailed inspection of it, divide it off into blocks or compartments so arranged that they should be uniform as regards conditions of soil and of planting, and then proceed to count and measure all the trees of 3 ft. girth and upwards, classing them in categories according to their diameter. He should then open a debit and credit account for each compartment, placing on the debit side the actual volume of the standing crop, and on the credit side the volume of timber removed at each successive felling. This register should always be consulted before undertaking any forest operation, and when the annual fellings fall due, it will show which compartments can best support the withdrawal of timber, and which require to be left untouched. Moreover, the balance-sheet will render an exact account, favourable or otherwise, of the condition of the forest.

Ten years of such systematic treatment would form in itself the basis of a regular forest working plan, and the doctor's prescription would no longer frighten the patient with its long words.

Our programme, however, was not yet complete, and fresh excursions awaited us in England. It took us only four days to reach Windsor Forest from Inverness, passing by the Caledonian Canal, and halting at Oban (from whence we visited Staffa and Iona) and Edinburgh, whence we took the train to London.

Even with a four-in-hand and the best of drivers, it would be im-

* A deer run, over unproductive land, has just been let to an American for nine years at the fabulous rent of £10,000 per annum.

possible to see Windsor Forest in such a short time as we had at our disposal.

The history of that noble park has been published in a splendid volume by the late Surveyor, but the history of Windsor is, so to say, a repetition of the history of England herself; if we follow all the phases in the development of this park, where, since the time of William the Conqueror, each sovereign in turn has given his name to some remarkable tree, Windsor Park may with justice be called the Westminster Abbey of British monumental trees; its history is one which belongs as much to archaeology as it does to silviculture, while in it the beautiful deer are almost as numerous as the trees themselves.

Nevertheless, the practical forester may rest assured that, although the first place is here given to art and beauty, he will still be able to find much to interest and instruct him. Windsor park is indeed one of the most magnificent fields for the study of forest botany that even the wildest imagination could conjure up. Here may be seen, growing singly or collectively in clumps, specimens of all the finest trees, native or exotic, which exist in Great Britain, and, since care has been taken to keep an exact record of the age and origin of each plantation, the forester would be enabled to follow out in detail studies of the highest interest and importance regarding the growth of the principal forest species. It would be more difficult to do the same with regard to their longevity; for one is led to think, in looking at some of them, that, in this hallowed ground, trees never die of old age. One sees in these relics of the past, that religious respect for things so characteristic of Englishmen, when even the most violent revolutions could pass over the country and yet leave these monuments and these trees intact.

The Surveyor of Windsor Park, who is, by turn, a forest officer, an organizer of shooting parties, a director of the royal workshops, and Conservator of a museum of antiquities, can, in consequence, have but little time to devote himself to silviculture, unless it be to prepare the iron armour, intended to preserve the veterans of the forest in their struggle against the elements, or to prop up with crutches some invalid deprived of a limb by a recent gale.

Having come all the way from Scotland to Windsor, we were not to be alarmed by the journey from there to the New Forest, for a few hours sufficed to carry us to Southampton.

As old as Windsor Park itself, the New Forest has not had the good fortune to be the dependence of a royal residence. The barrenness and poverty of the soil has sufficed to preserve it from being plundered even at an epoch when land was valued more for its extent than its fertility. But, on the other hand, this very fact attracted a poor and necessitous population to settle in and around the forest, who, during long ages, have been accustomed to derive a precarious existence from it, and by careless abuses have threatened it with certain ruin. For many centuries the New Forest has thus been a prey to commoners, who use up its resources without either method or control. One may see there the steady onward progress which is made by the heather; and, although it is not perhaps so quick under the feet of the almost wild ponies and cattle as under those of the sheep, yet it is none the less sure.

The sole remedy for this state of things was to restrict the commoners to certain defined localities, and that could only be done by sacrificing a portion of the forest to save the rest. This is, in fact, what was done about twenty years ago; but the sacrifice has indeed been a heavy one, for the reservation of some 14,000 acres has cost the abandonment of 49,000 more. The part

which has been freed, however, is sufficiently extensive to constitute some day a respectable forest, whilst the part given up is hurrying to its destruction in a manner deplorable to behold, and, before very long, there will be nothing left but a worthless barren heath.

It is not, however, in 20 years that a forest so badly used as the New Forest can be restored. The first thing to be done was to put the soil in good order, and then to plant some of the vast stretches of heather with fir. Of late years the forest officers have sought, by excluding the cattle, to bring about the natural reproduction of some portions hitherto abandoned to pasturage. But with whatever care these operations may be carried out, at least 50 years must elapse before they can resort to systematic fellings, with a view to furnishing a regular revenue.

At present, contiguous portions of the forest often present the most curious contrasts. On one hand we see young fir and oaks growing side by side, in another place a forest of pure oak, languishing among chestnuts, and in a third plantations of fir and beech, indicating by the vigour of their vegetation, and their healthy appearance, that it is on them that the future of the forest ought to depend. Further on there is a valley filled with aged beeches, whose weird forms gave an almost supernatural aspect to the spot; we almost expected to see the ghost of William Rufus pursuing that of Walter Tyrrell through the haunted forest.

Without contesting the marvellous beauty of some parts of the New Forest, so dear to artists and lovers of nature, we are bound to say that before long it will *not be here* that a professor of sylviculture, desirous of teaching his science, will choose to pitch his tent.

On our return to Lyndhurst, after the excursion in the New Forest, there remained but three days at our disposal before our duties necessitated our return to France. These were employed in visiting the Forest of Dean.

The present Forest of Dean occupies the site of the old forest of the same name, which formerly covered the whole of the plateau between the estuary of the Severn and the valley of the Wye. ("Dean," "den," signifies "forest" in the old Celtic language.) The old forest has disappeared within the last few centuries, owing perhaps to the demand for charcoal and mine-props for the local industries; if, however, we were not afraid of being accused of being prejudiced, we might say that unrestricted pasturage may have had something to do with the disappearance. It is on these ruins that the new Forest of Dean has been created; in less than a century, more than 16,000 acres of the original 22,000 have been replanted. The older plantations are generally of pure oak; the beeches, chestnuts, and birches form but a small percentage of the trees. Scotch fir, spruce fir, and larch are generally only found in the plantations made during the last 30 years or in bad peaty portions. The state of vegetation is generally good, varying, however, with the quality of the soil, but indicating in every point the artificial nature of the forest.

We may take this opportunity of remarking that a plantation of "broad-leaved" trees (oak, beech, &c.) takes a much longer time to establish itself than one of "needle-leaved" trees (conifers,—Scotch fir, larch, &c.). In Scotland we saw the most magnificent plantations of larch and fir, whilst in the Forest of Dean the plantations of oak were always more or less dwarfed in appearance. The cause of this is that oaks furnish the soil with much less vegetable manure than the coniferous trees; and again, in an oak plantation there is a marked absence of undershrubs and spontaneous ground vegetation, which, by their organic remains, tend to increase and improve the surface soil. It is rare also that a plantation of oaks, on a soil which has

been long unoccupied by forest vegetation and is but moderate in quality, succeeds well during the first generation ; it is only at the second generation that the trees acquire their normal development.

At present, while the trees are yet in their youth, the only cultural operations that can be undertaken are the periodical "thinnings," and these are here conducted with great skill. There is, no doubt, however, a great future in store for the Forest of Dean, thanks to the workmanlike manner in which it is managed, and to the laws regulating the pasturage which date back to the time of Charles I.

We were not able to suppress a certain vague feeling of sadness in wandering through these endless plantations, rendered so dreary and monotonous by the total absence of that undergrowth which seems to inspire the woods with freshness and life ; and it was with a sense of great relief that we emerged from them, and entered into a well-managed forest composed of standard oaks surmounting coppice wood.

This forest, comprising about 3,400 acres, was formerly the property of Lord Gage, and was purchased by the Crown with a view to presenting it to the Duke of Wellington. It is composed of pure oak, and for more than 100 years the coppice has been cut every 18 years. We might add that the reserved trees form the staple element in this forest, for the coppice forms but a small proportion of the standing crop. These reserves, varying in age from 20 to 100 years, are in an excellent state of vegetation, and number about 80 trees to the acre. The largest trees are about 4 or 5 feet in girth, and from 25 to 35 feet in height of stem. It would be a great pity to cut them until they have attained at least double their present age. This forest would form an excellent field for the study of the treatment of standard oaks.

In such a forest, where the soil is so exceptionally fertile, it might be possible to find a solution to the oft discussed problem of obtaining the maximum production in quality and quantity from a forest of oak. This was, at least, the impression we carried away with us as we turned our faces homewards.

We had barely sufficient time, on our arrival in London, to pay our respects to the authorities at the India Office, when we were asked by Sir Louis Mallet to place on record the observations which we have now the honour to submit, and to state whether, in our opinion, the immediate foundation of a Forest School in Great Britain is possible. In order to reply to this question, it was necessary for us, even at the risk of our narrative being found tedious, to enter into a somewhat detailed account of the Scotch and English forests.

Were it only for the purpose of replanting the five or six millions of moor and waste land which cover one-third of the Highlands, we should consider there was a sufficient reason for the formation of such a school. The question, however, must be studied on broader grounds.

Considering the present depressed state of agriculture all over Europe, it becomes more and more necessary to endeavour to draw the greatest possible advantage from the land, and, by properly adapting a different vegetation to different soils, to seek to obtain, through the medium of the enormous capital which the present generation can command, the maximum production from a minimum area. It is thus that the forests are called upon to play an important part in the immediate future, and the farmer will henceforth find a powerful auxiliary in the forester.

After making every allowance for the great fertility of the soil in Great Britain, we feel certain that in many districts more than one of the forests

which were cleared some time back would now be jealously preserved by the same proprietors who formerly cut them down to satisfy their pressing wants.

It must also be borne in mind that the British empire is not confined to Great Britain and Ireland, and that, by reason of her immense possessions, England is, perhaps, of all nations in the world, the one most richly endowed with valuable timber forests. It is by hundreds of millions of acres that we may reckon the forests of Canada, India, and Australia, New Zealand and Cape Colony, not to speak of those in the West Indies and Berneo.* All these natural resources of wealth are worked by British enterprise and British capital, and, consequent on the present wonderful development of commerce throughout the globe, it is a matter of importance to every civilized nation that this vast accumulation of forest riches should not fall into the hands of ignorant persons, or be squandered away regardless of the future.

For these reasons the establishment of a Forest School in England becomes a matter of primary importance.

The science of forestry is, however, a science of observation, based upon facts which must be studied both from a practical and theoretical point of view. It is therefore absolutely necessary that a Forest School should have attached to it a forest which has for some time past been under scientific management, serving, so to speak, as a natural laboratory for experiments, and without which the best theoretical teaching in the world would be of no avail. This is especially the case in England where the young men, by reason of their national character and their mode of education, are accustomed to pay more attention to facts than to theories; here the teacher of a technical profession, resting solely on theories, would command very few disciples.

It is, therefore, a matter of regret that, among all the forests visited by us in our travels, there is not a single one suitable for the teaching of sylviculture on that broad basis so essential when the pupils are called upon to apply it in all quarters of the globe. In England, as in Scotland, all the woodlands may be arranged in two categories,—the one containing plantations too young, recently created by the hand of man,—the other containing plantations too old, or too much overworked, to be useful for the purpose; nowhere did we see a high timber forest formed of really mature trees.

Moreover, a plantation must always be incomplete as a field of study, and especially for persons who will generally have to deal with natural forests. Nature, ever prodigal of her bounties, if left to herself scatters them broadcast without any regard for the particular wants and requirements of man. It is then the work of the forester to control this generous prodigality, and, by careful selection, to concentrate her fertilizing powers on such trees as are best adapted to meet the general demand. In the case of a plantation there is no need for this interference; here, natural selection, the struggle for supremacy amongst the different species, and even art herself, can play but a very insignificant part in the various phases of its existence.

In a forest, then, of this nature it would only be possible to apply a very limited number of the principles of sylviculture.

A practical Englishman will have no difficulty in understanding our meaning.

It is not to be supposed, however, that the foundation of a Forest School is at present an impossibility, for, while leaving the question of time and place to be settled hereafter, it would be advisable to at once decide, in

* The total extent of the forests in the British possessions is 340,000,000 acres of timbered land.

principle, on its creation ; such a decision is the only mode of arriving at its foundation. It is necessary also to take measures for preparing the public mind to regard the science of silviculture as an additional means of developing the national resources, and to take steps for the gradual creation of accessory forests.

This accessory forest must necessarily be incomplete at first, but would be perfected in time ; but the essential point is that it should be placed under the absolute control of the officers of the school. This can only be done by choosing a State forest. If it should be considered desirable also, in order to render the teaching more complete, the State ought to purchase or lease in Scotland a forest suitable for the purpose.

We would also suggest the founding of Professorships of "Forest Economy" at two of the great public seats of technical instruction. One of these might be instituted at Cooper's Hill for England, the other at Edinburgh for Scotland.

The Professors should be selected from among the young men who have received a thorough forest education on the Continent, and have had eight or ten years' practical experience in India. They should publish from time to time a series of articles in the leading agricultural and forest journals, in order to influence the landowners in favour of a systematic management of their woodlands, and to prove to them that uncontrolled pasturage is the certain destruction of forests, and that, in the long run, the timber furnished by forest land is of greater value than pasturage or game.

The establishment of a course of Silviculture at Cooper's Hill would have the great advantage of giving to the young engineers a rudimentary knowledge of a science which cannot fail to be useful to them in their after career. It would, perhaps, also be possible by this means to modify the present method of recruiting the Indian Forest Service, by offering to the students at this excellent institution a certain number of appointments in that service.

The course of instruction afforded at Cooper's Hill would then comprise all the essential parts of the education of a forester, and it would only be necessary to supplement it by sending the selected students for one year to a Continental school, where they would have the opportunity of perfecting themselves in the practical details of forest culture. After this, it would be advisable for them, accompanied by their English Professor, to complete their training by making a tour of inspection in some of the mountain forests of France, Germany, and Austria. So prepared the young men would be perfectly capable of undertaking forest work in any portion of the Indian Empire.

In conclusion, we beg to submit the following recommendations :—

- 1st. That a National Forest School be founded in Great Britain.
- 2nd. That Professorships of Silviculture be instituted at Cooper's Hill and at Edinburgh.

Such are the conclusions at which we, in conjunction with our travelling companions, Messrs. Reuss and Bartet, have arrived, and we feel that an apology is due for their length. This is really due to the excessive courtesy of our hosts, who, jealous of the success of Jules Verne's hero, who made the tour of the world in 80 days, were determined to make us traverse, in less than three weeks, more than 300,000 acres of forest land situated in the most opposite parts of Great Britain, from Cape Duncansby to St. Catherine's Point.

REMARKABLE TREES AT STAUNTON HAROLD.

STAUNTON HAROLD, the seat of Earl Ferrers, is situated in the north-west of the county of Leicester, on the confines of Derbyshire, in a noble and beautifully timbered park, in which are many fine trees of notable dimensions, as well as of graceful and picturesque habit. In recent years many beautiful varieties of conifers have been planted in the pleasure grounds in the vicinity of the Hall, which will lend an additional charm to the woodland scenery, as they grow up and display their elegant evergreen forms and varied outlines, in contrast with the more irregular forms and changing habits of the deciduous trees. Among others which have been introduced, and which are promising to grow into beautiful specimens, are the following:—*Abies Albertiana*, *A. Douglasii*, *A. Hookeriana*, *A. orientalis*, *A. canadensis*, *A. concolor*, and *A. excelsa* *Clanbraziliana*; *Picea magnifica*, *P. Nordmanniana*, *P. nobilis*, and *P. pinsapo*; *Pinus Austriaca*, *P. excelsa*, and *P. strobus*; *Araucaria imbricata*, *Wellingtonia gigantea*, *Cryptomeria Japonica*, *Cupressus Lawsoniana* and most of its beautiful varieties; *C. Nutkaensis*; *Thuja Lobbii*, *T. occidentalis* *Ellwangeriana*, and *T. o. Vervœneava*. During the last two years a number of the elegant and interesting Japanese conifers have been introduced, including *Abies polita*, *Biota japonica*, *Cryptomeria elegans*, *Pinus densiflora*, and *P. parviflora*, *Retinospora erisoides*, *R. filifera*, *R. obtusa*, *R. o. aurea*, *R. o. gracilis aurea*, *R. plumosa*, *R. p. aurea*, *R. p. argentea*, *R. pisifera*, *R. p. aurea*, *R. leptoclada*, *R. squarrosa*, *Thujopsis dolabrata* and *T. d. variegata*. These are all thriving young specimens, and form a very interesting feature in the grounds. On the lawn there stands a remarkable larch, with a magnificent head of wide-spreading branches. Its height is only about 50 ft., but the vigorous stem measures 13 ft. in girth at five feet from the ground, and is crowned with a splendid canopy of branches, the greatest diameter of which is 80 ft., and the circumference 231 ft. Not far off are three grand examples of Scots firs; No. 1, girthing 12 ft. 3 in. at five feet; No. 2, 11. ft. 6 in.; and No. 3, 10 ft. 3 in., all three divided into two immense limbs at about 14 ft. up, showing that something had interfered with their leaders, probably in the same season, and caused them to fork. Near by stands a splendid oak, with a clean, straight bole of 50 ft., and girthing 12 ft. 3 in. at five feet up, with very little taper throughout. A very handsome purple beech stands about 80 ft. high, with its branches sweeping the lawn in a ring 162 ft. in circumference.

Entering the park an immense variegated sycamore first attracts

our attention, the massive stem of which girths 16 ft. 9 in. at five feet from the ground, and is surmounted by a grand umbrageous head, measuring around the points of the branches some 288 ft. in circumference. The park is bounded on the north and east by a ridge of the limestone formation, which prevails in the district. Along the top of this ridge is a belt of grand old beeches, consisting of about 200 trees. They have reached their best, and several of them are already showing signs of decay, although the majority are hale veterans that may last for some generations as a conspicuous object in the landscape.

They range from 80 ft. to upwards of 100 ft. high, and have a girth of bole varying from 8 ft. to 16 ft. at five feet up. At one end of this belt, at the extremity of the ridge, stands a splendid "bonnet-headed" specimen of the Cedar of Lebanon, having a straight clean stem of 60 ft., which will average throughout 9 ft. in girth. The next and last tree our space will permit us to notice is a gigantic and massive-limbed beech, remarkable for the subdivisions of its branches. Girthing 21 ft. 6 in. above the swell of its roots, it branches out at six feet up into two main stems—the right-hand stem going straight up, while the left-hand one branches off again at ten feet from the ground, and these two branches subdivide again into two and three respectively at sixteen feet up. The various girths are ; at spring of branches, where they first divide, 25 ft. ; right-hand branch, 11 ft. ; left-hand one, 40 ft. ; sub-branches 18 ft. and 14 ft. The tree is upwards of 120 ft. in height, with a spread of branches 36 yards in diameter. When in its prime this must have been a magnificent tree, but much of the top is now decayed. Several fine limbs have been broken off by storms or neglect, and the wounded parts not having been properly attended to, rot and decay are making sad inroads, which threaten in a few years to completely ruin this noble landmark of bygone times.

AUSTRALIAN BIG TREES.

THE marvellous dimensions of Australian forest trees are not generally known, and there are few people—we may even say, few travelled people—who would not name the *Sequoia gigantea* of California as furnishing, both in height and girth, the grandest specimens of timber in the known world. The exhibition of the bark of the butt of the "Mother of the Forest," which was set up at the Crystal Palace and unfortunately destroyed in the fire which laid the Tropical Department in ashes, first drew the attention of the general public to the vast size of the timber on the Pacific slope. There are many who remember the stately proportions of that skeleton tree, and

are yet unaware of the fact that the very tree from which the bark was shipped for exhibition at Sydenham is still green and flourishing in the Calaveras Grove, near Stockton, California. The *Sequoia gigantea*, or *Wellingtonia*, as it is generally styled in England, is found nowhere but on the western slopes of the Sierra Nevada, and there only in some eight districts, where it grows in groups, or groves, at an altitude of some 5,000 ft. above sea-level. The Mariposa Grove, thirty miles south of the superb Yosemite Valley, is the most famous, and comprises 450 trees, of which number 150 have a circumference of 40 ft. and upwards at the butt, and are from 250 to 300 ft. in height. The largest in girth of those still living, called the "Grizzly Giant," measures 94 ft. in circumference at the ground, but the "Fallen Monarch" is estimated as having been 120 ft. in girth, and upwards of 400 ft. in height when standing. Its prostrate form has been completely burnt out by forest fires, and up the huge tunnel thus formed the writer of these lines rode on horseback for a distance of 70 ft. without having to bend his head. Several of the branches of the "Grizzly Giant" are as much as 18 ft. in circumference, and so equal the girth of the trunk of our noblest English forest trees. The Calaveras Grove contains 92 trees exceeding 45 ft. in girth, and ranging in height from 150 ft. to 330 ft. The "Mother of the Forest" above mentioned is 321 ft. in height and 90 ft. round, but the largest specimen, as in the Mariposa Grove, is prostrate. This is the "Father of the Forest," and measures 435 ft. in length, and 110 ft. in girth at the butt. The chief other groves are the Tulare, Fresno, Merced, and Tuolumne; the first-named is said to be eight miles in length, and to boast a tree 123 ft. in circumference twelve feet from the ground, but I am not aware that this measurement has been properly authenticated.

Thus much of the "Big Trees" of California. Other countries have also their giants to boast of. The vast forests of Siam and Cambodia have their share. Equatorial Africa and Brazil also produce mighty specimens, especially in point of girth, but their size is in most cases due in a great measure to the luxuriant growth on their trunks of creepers, lianas, and roots depending from the upper branches, which form a rugged outer casing or shell to the butt, whereas the *Sequoia* has no parasite save here and there a festoon of lichen, clinging to its ruddy brown bark. And there is little doubt that the Californian giants, so far as girth is concerned, are the largest trees in the world.

Girth, however, is not by any means the supreme characteristic of size in timber, and altitude fairly claims its right to consideration. It is now some six years since Mr. Ferguson, the Inspector of State Forests, made his report on a tour of examination of the timber in Gippsland,

Victoria. He found along the valley of the Watts River many specimens of *Eucalyptus obliqua*, *Eucalyptus amygdalina*, and *Eucalyptus goniocalyx*, of dimensions never previously heard of in Australia. Many were measured at 350 ft. in length, as they lay on the ground destroyed by decay and bush fires. The hugest of all formed a complete bridge across a deep ravine. Its top was broken off by its fall, but the trunk thus maimed was found to be 435 ft. from the roots to the fracture, and in girth at five feet from the ground it measured 54 ft. As the trunk where broken off measured 9 ft. in circumference, Mr. Ferguson estimated the height of the tree, when standing, at upwards of 500 ft.

The trackless forests in the west of Tasmania also contain huge timber, and bushmen report that they have met with specimens of *Eucalyptus* measuring 200 ft. from the ground to the first branch, and fully 350 ft. in all. Until 1873 there was standing in the eastern slope of Mount Wellington, within four miles of Hobart Town, a *Eucalyptus* measured at 86 ft. in girth and more than 300 ft. in height, and its ruined boll still forms a grim chamber in which many a merry party have enjoyed a picnic. The famous tree of the Huon forest measures 70 ft. in girth six feet from the ground, and is stated to be 240 ft. high, but in the deep gorges of this grand forest the writer has seen higher trees than this, though not of quite equal circumference.

But Victoria now claims the glory of owning the biggest of all the living "big trees" in the world, so far as height is concerned. In the Dandenong district at Fernshaw has recently been discovered a specimen of *Eucalyptus amygdalina*, or almond-leaf gum, which has been accurately measured as reaching the enormous height of 380 ft. before throwing out a single branch, and 430 ft. to the top, and having a girth of 60 ft. at some distance above the ground. Some idea of what a height of 430 ft. represents may be gained from the fact that this gum-tree, if growing by the side of the Houses of Parliament at Westminster, would over-top the Clock Tower by exactly 100 ft.

The above statistics lead to the conclusion that though the *Sequoia* is still rightly considered the "big tree" of the world in point of girth, it is surpassed in height by the giant *Eucalyptus* of the Australian forests.

A. G. GUILLEMARD.



THE HOME FARM IN APRIL.

ARABLE LANDS.—Should any *corn* remain unsown, get it in at once. Also *parsnips*, *carrots*, and *potatoes*, for main crops should be planted without delay. After the middle of the month *mangolds* should be drilled upon heavy lands, or even upon medium soils. Upon the lighter ones we have found the crop run much to seed if put in too soon. Sutton's Mammoth, Long Red, and the Golden Tankard can be recommended. The Silesian is rich in saccharine matter. The Yellow or Orange Globe crops and keeps well. Push forward steam cultivation for cleaning land of all root-crops, stirring the land deeply and well rather than ploughing it. Lucerne may be drilled at the rate of 15 lbs. of good seed per acre. The middle of the month is a good time for getting in this crop. The land should be in a fine and clean condition, and the seed should be only lightly covered. Horse and hand-hoe wheat and other corn crops. Sow clover and grass seeds upon a fine but firm seedbed, cover slightly, and leave the surface either rolled down or lightly harrowed. Sow heavy and light seeds at two operations.

Live Stock.—The greatest attention must now be given to the ewe flock. Close watching during lambing, liberal feeding according to the state of the grass upon the pastures, a little corn or cake, and a fair supply of mangolds, may be expected to yield good results. Send fat stock to market. With the favourable weather we have had green food for horses will now come in, such as rye and rye-grass, and with these in abundance the allowance of corn may be lessened.

Hops may be poled at once. The cutting or dressing of the hills will have been finished before this time. Tread hop-gardens as little as possible in wet weather. See that the poles are firmly planted in the ground, and the tops kept as far as possible equidistant.

Pastures.—Continue to roll and drag these, and keep all stock off the lands intended for mowing. If manured in the autumn, or if roots, cake, or corn have been liberally fed off upon them, the grass will now have obtained a good start.

Dairy.—Wean off calves and give the cows a fair allowance of roots or of cut green food. Rye, ryegrass, and comfrey may be freely given. Where milk for the calves runs short give them a liberal allowance of boiled linseed.

Poultry should now receive every attention, such as warm shelter, and liberal feeding. Bread and milk for chickens, with something a little more stimulating for the weakly ones—such as bread steeped in ale or port wine and afterwards squeezed nearly dry—will suit them

best. Let goslings have a good safe run. Turkeys should begin to sit, and the eggs may either be placed under the domestic hen, or be hatched and the young reared by the natural mother.

Estate work, such as clearing falls of timber and underwood, filling the timber and wood-yards, carting road material, &c., fencing, and such like, may go on whenever the farm-work will admit of this. With the present mild weather, bark may be stripped and ready for delivery by the end of the month.

A. J. B.

THE FATE OF AN HISTORIC TREE.

PERHAPS one of the best known and celebrated trees in Ireland was the one that grew over what is known as the "Artist's Rock" in the Dargle, near Bray, County Wicklow. It was known by thousands who had never seen the living tree in its natural size; as it has been represented in endless numbers of pictures produced by landscape painters of greater and less fame. It came to its end last autumn by one of those strange accidents which befall men as well as trees. An excursion party consisting of boys from one of the Dublin Ragged Schools visited the Dargle. Three of the boys climbed the overhanging and venerable tree, when to the surprise of all present, the tree was seen to give way and come down, owing to the top weight being too much for its old gnarled roots which broke away from the earth. The old tree thus fell prostrate into the picturesque river which it had overshadowed and adorned for more than a century. The boys were rescued from their perilous position principally through the exertions of a photographic artist, who happened to be taking views at the time. Artists and tourists visiting the Dargle will miss a dear and old acquaintance, which, though passed away from its natural site, will long live in numerous well-known pictures, in all of which it constitutes a most attractive and prominent feature in the composition. Amongst those who will regret it most will be its noble owner, Viscount Powerscourt, who is justly proud of the Dargle—one of the loveliest bits of sylvan scenery to be found in the Emerald Isle.

THE BONE TREE.—Captain Maclear, commanding H.M. surveying ship *Alert* writes to the *Standard* last month:—"In August last there appeared in the *Standard* a letter from Lieutenant de Hoghton about the pearl-shell fisheries in Torres Straits. In this he mentioned a curious tree that picked up bones. The account was so curious that I wrote to Mr. Chester, the resident magistrate at Thursday Island, for an explanation, and I think his answer will interest your readers:—"I have made inquiries about the tree, and I find that it grows at Marbiac, not far from Pearson's Station. It is a kind of Banyan, or Fig tree, and sends down long vines, or tendrils [roots], from its upper branches; these run along the ground, and twine round any small obstacles in their path, such as bones and other unconsidered trifles. The vines afterwards contract, and draw up whatever is attached to them. This is Pearson's explanation of the phenomenon."

THE TEACHING OF FORESTRY.

BY COLONEL G. F. PEARSON.

PART I.

AS announced by us last month, Col. Pearson read his paper on the Teaching of Forestry before an influential meeting of the Society of Arts, on March 1st. Sir John Lubbock, Bart., presided, and introduced the lecturer, who proceeded to read the following paper, for the report of which we are indebted to the *Journal of the Society of Arts* :

In presenting myself before you this evening, I would solicit your indulgence in my endeavour to offer to your notice a few facts about forestry, a science which is daily attracting more and more attention in all the countries of Europe, as well as in the colonies of Great Britain, and in the United States of America. This is, no doubt, owing in part to the depressed condition of agriculture during the last few years in Europe; but it is due also largely to the increased demand for timber which the advance of civilization brings with it. For where in some industries, as in shipbuilding, iron has largely taken the place of wood, in numberless others, as in railway works, the drain on the forests has enormously increased. I trust, that, without entering into any complex questions of sylviculture, which, however interesting in themselves, would be too long to discuss here, I may be able to place before you a few facts which may be worthy of your attention. I will first endeavour to give you a short sketch of the rise and progress of scientific forestry in European countries, and afterwards very briefly to explain the principles on which it is based.

Sylviculture, or the culture of forests, as it is understood and applied in the countries of Europe,

where it has been studied as a science, is the application to woodland property of certain economical principles, which, in their spirit, contain nothing more than what is held to be necessary for the well-ordered management of landed property in general; and which may be summed up as follows:—

1st. The obtaining, within approximate limits, of a regular sustained revenue from the land which the forest covers.

2nd. The utilization, to the fullest extent possible, of the natural productive powers of the soil.

3rd. Progressive improvement in the value of the property.

4th. Final realization of the crop to the greatest advantage.

It is in the development of these principles, and in their application to forests of different sorts, that the true science of forestry consists.

Now, for various reasons, but chiefly on account of the abundance of coal in Great Britain, and the facilities of obtaining at cheap rates all sorts of timber from other countries, which our commerce affords, the management of forests has not as yet attracted so much attention among ourselves as it has done elsewhere; and even where, as in Scotland, considerable natural forests existed in times past, since railways have penetrated into distant parts of the country, they have too often been cut down, and their value realized; and in consequence, natural mature forests of any great extent do not at present exist in Great Britain; and though there are a fair amount of plantations, in various stages of growth, and some of them of considerable extent, and in excellent order, their treatment has

up to the present time been confined to simple cultural operations, and their management as forest property has been but little thought of. To this may be added the fact, that all the great forest properties in Scotland, and most of those in England, belong to private owners, whose interests will not always allow of their working their forests for results which can only be properly developed after a long series of years. These and other similar reasons have, up to the present date, stood in the way of the growth among us of any sound system of managing our forests; but there can be no doubt that the subject is now beginning to attract a far larger amount of public attention than it has ever yet done before.

Before going any further, it may be interesting to sketch briefly the history of the rise and progress of forest science on the Continent of Europe.

During the early periods of civilization which succeeded the Roman occupation of Gaul and Great Britain, the forests, both in our own country and on the Continent, covered vast areas of country, and it was one long-continued struggle of the population against their growth, which was then equally an enemy to pasturage and cultivation; often, too, where border feuds and wars were of constant occurrence—as in Scotland between the different clans, and also between the lowlands and the border counties of England—the forests were burned and destroyed by the conquerors, in order that they might not be used as a refuge by the other party, or as a shelter for making reprisals. The timber, as such, had then no value whatever. Later on, while the population was still sparse, and roads and other means of communication were few and difficult, timber had but little value, except near the large towns, and at this time the forests were objects of interest only to the princes and nobles, who used them as their hunting grounds, and who

carefully preserved them from encroachment as long as their interests in this particular were not interfered with—but not otherwise, for it was at this period that those common rights sprang into existence, which, arising out of compromises between the population and the nobility, have in later times proved such a fertile source of trouble to forest conservators both in England and on the Continent.

It was about the beginning of the seventeenth century that the then rapid disappearance of the forests seems to have first attracted attention in the different countries of Europe; and among the first traces of attempts at forest management, certain regulations may be quoted, which were made so far back as the reign of Elizabeth, to regulate the number of standard trees in the oak-coppiced forests belonging to the Crown. In France, the *ordonnance* of 1669, issued at the instance of the great minister Colbert, had a similar object. These regulations, however, were simple measures of police, restricting the felling of certain trees, under certain conditions, and they contained no scientific principle whatever; while the agents employed to carry them into execution were probably persons of the lowest class, living in the immediate neighbourhood of the forest, and consequently too often ignorant, dishonest, and interested, as the long list of fines and punishments inflicted on them for frauds and embezzlements, which still exist, seem to indicate. It is very doubtful if the forest even benefited at all from their care. Nevertheless, the subject was not entirely lost sight of in France, as the studies of Duhamel de Monceau, Linné, Bernard de Jussieu, Buffon, and Cuvier go to prove. Later on attempts were made to work on what we should call, now, a regular system; by fixing a certain period called a revolution, in which the forest was destined to be cleared off entirely, and repro-

duced by natural seeding; and to this end it was divided into a number of compartments equal to the number of years in the revolution, one of which was felled every year, or at such regular intervals of time as was determined in the working plan, a few standard trees only being left as seed-bearers. This system was known in France as that of *tire et aire*, and continued in operation till within the last half century. But this, as is now well known, will not suffice to ensure the regular natural reproduction of a forest, and, in consequence, it often happened that those so operated on were either ruined entirely, or were changed altogether in their character. Indeed, any approach to sound forestry was unknown in France till the forest school was established at Nancy, in 1824.

Previous, however, to this date, and, indeed, before the close of the last century, considerable progress had been made in the right direction by the German foresters on the other side of the Rhine, who were undoubtedly the first to base the principles of forestry on observation, and to treat it in a scientific manner — Hartig (1762–1837), Cotta (1763–1844), Hundeshagen (1783–1844), were the founders of that system of working forests by thinning at regular intervals, first, for the improvement of the crop, and afterwards for its realization, which has since been developed into a regular science in the forest schools of Germany and France. Hartig founded the school of Dillenburg, in Nassau, where, in the year 1800, he had at least 70 pupils. Cotta founded that of Thorandt, in Saxony, which in the year 1812 numbered upwards of 100. These schools seem to have disappeared about the year 1820, and were replaced by others in all the German States, viz., at Elberswalde, in Prussia (founded in 1867), Tharand, in Saxony (founded on the old establishment of Cotta, soon after 1820), Munden, in Hanover; Giessen,

in Hesse; Aschaffenburg, in Bavaria; Tübingen, in Wurtemberg; Eisenach, in Coburg. It was not till the year 1824 that any step was taken in the same direction in France, when the Nancy school was founded, with Lorenz as its first director. The *Code Forestier* was published in France in 1827, but it was not till 1837 that the first edition of a work on forestry appeared there, in the shape of the lectures of Lorenz, edited and published by his successor, Parade, at the Nancy school. Since then, however, the work in France has been vigorously developed, and the Nancy school has taken a high place among the schools of Europe, chiefly owing to the long and happily uninterrupted labours there of Monsieur Nanquette, the late director, the late Professor Bagnieria, who for twenty-two years was Professor of Forestry at the school, and Professor Broillard, now Conservator of Forests at Macon, whose teaching, and whose work on forest management, have done more, perhaps, than anything else to clear the subject of forestry in France from empiricism, and to place it on a thoroughly practical foundation. Nor have the Germans, who first led the way, remained behind their French colleagues, as any one who will take the trouble to visit their admirably managed forests must allow. Nowhere can the practical results of the natural system be seen better than in some of the German forests, where it has been in operation in some places for at least a century.

Besides the establishments for teaching forest management in Germany and France, schools of sylviculture now exist in all the principal countries of Europe, except in Great Britain. Austria, Italy, Russia, Switzerland, and even Roumania, most of them, after sending pupils for a few years to the French and German schools, have set up schools of their own, and thus rendered themselves independent of foreign educational aid. The United States

of America, only last year, sent an able and distinguished man (Dr. Hough) to visit all the forest schools in Europe, with a view of founding one in America; and it is no doubt to be regretted that, as yet, no steps have been taken to do the same in Great Britain; for with us, as elsewhere, a forest school would become, not only an establishment for teaching sylviculture, but also a centre of study and practical observation, from whence a knowledge of sylviculture, as a science, would be spread abroad, for the benefit of society in general.

It is certain that unless the forests of a country are properly and economically managed, the time may come, when as was the case in India, it will find itself without the means of procuring the needful supply of timber, except at an extravagant price; while at the same time the general interests of the community require that a fairly abundant and cheap supply should be constantly available. This is especially the case where, as in the great continental areas, deficiency in the means of transport, or the distance from the timber-producing tracts, adds materially to its cost. In such cases experience has shown that the only practicable way out of the difficulty is for the State to intervene; and although in England we have special facilities for supplying our wants from abroad, owing to our extended commerce with all countries, the extreme limits of a reasonably cheap supply seem to have been reached; and at all events State action seems so far desirable as to help private proprietors to make the best use of their timber-producing lands.

In India considerable progress has already been made in the right direction; for there the question forced itself into notice more than a quarter of a century ago, and the first steps for forming a regular forest administration there were taken immediately after the mutiny. Dr. Brandis was appointed Inspector-General of

Forests in 1863, and in 1867 his scheme for training foresters for India in the schools of France and Germany was, after much discussion, adopted finally by both the Home and Indian Governments. Indeed, as a matter of fact, at home there were neither foresters who could teach the science of sylviculture, nor schools in which it could be taught. It is not too much to say that, in spite of the drawbacks inherent in such a system, the result has amply justified Dr. Brandis's expectations, for the foreign schools have given the State a body of able men, thoroughly grounded in the management of natural forests covering extensive tracts of country, as they do in India. But, meanwhile, nothing has been effected for the advancement of forest science at home; and this is, in consequence, the weak point in an otherwise admirable system. The practical disadvantage of this is now beginning to make itself felt in regard to our Colonies, where forest management is now manifesting itself as the great economic question of the day. Within the last two years both the Cape of Good Hope and Cyprus have been furnished with forest officers from France, owing to the absence of any available educated men in our own country. The Mauritius, Ceylon, the Straits Settlement, Hongkong, Fiji, and other Colonies, are all following suit, and have recourse to Kew and other similar institutions for foresters. But these institutions are incapable of supplying their wants, for the creation of plantations is a very different study from the management of forests which already exist in a natural state.

Now, the cause of the present difficulty is not far to seek. It is that there lacks with us anything like a central establishment at the head-quarters of the Empire, from which experts might be sent to the Colonies, and from which our own

great proprietors of woodlands would, doubtless, often too gladly supply their wants for foresters. We have now in India a fair number of educated foresters, who know their work well, and some of whom, at least, are men of high professional attainments, able to hold their own with the highly-educated foresters of the Continent. It is not too much to hope that the services of some of these men might be utilized, to teach forestry at home, and to put in order some portions of forest in England and Scotland, where practical instruction in the what is known as the natural system of silviculture, might be given. Thus, in due course, England might become independent of foreign countries for the education of her foresters.

PART II.

It will be now right that I should, with your permission, explain as briefly as possibly what are the principles of forest management as taught in these schools.

Forestry divides itself into two branches; the first is called silviculture, or the culture of woodlands in all that concerns the crop which grows upon them; the second refers to their administration from an economic point of view, or, in regard to the supply of timber for sale or use by the community, and the revenue to be derived from them.

As regard the first, it may be said that there is no mystery in scientific forestry. It means simply to observe the action of nature in a forest, and to follow it, or to utilize it for our advantage, when we are able to do so. Its object, then, should be to obtain the utmost possible advantage from the soil, by keeping it always covered by a growing crop of trees; and, when the trees arrive at maturity, to remove them in such a manner that the smallest possible interruption may be caused to the productive work of nature in the forest.

Now, the natural reproduction of

the forest, when the trees are removed, is the corollary of the above considerations. In a natural state, the reproduction of the forest is effected by the germination of the seed which falls from the trees in it, whenever the necessary air, light, and warmth are admitted to the ground, by the fall of any tree, either from accident or age; the work being carried out gradually, and the soil never being exposed over any large area at once. For the young seedlings which spring up would wither and perish at once unless they were sufficiently shaded. So in forest operations, when the time has come for the removal of the timber, on no account should the ground be anywhere cleared of trees at once; but a commencement should be made by felling a tree here and there, and so breaking the thick cover of the forest, to allow sufficient air and light to reach the ground, and so cause the seed which has fallen to germinate. In this way, about one-fifth of the mature trees should be removed every five or six years, never breaking the cover by making large gaps in it, but taking a tree here and there, and always leaving the finest and most vigorous trees till the last; so that in about thirty years the whole of the old trees will be cleared off, and a new forest established in their place. Thus the seeding of the forest will be effected by the agency of the finest trees, which will be themselves all the while increasing in bulk, and thus the productive power of the soil will be utilized to the fullest possible amount. A short calculation will show that a tree 10 ft. in girth, which makes a ring of wood of only one-eighth of an inch in thickness, adds to its bulk at the rate of rather more than one cubic foot of timber annually for every 10 ft. of the length of its stem; or, in other words, such a tree, if its stem be 30 ft. in height, will, in thirty years, have increased in bulk

by at least 100 cubic ft. of solid timber. At the same time, during these thirty years, the young trees which are springing up will become perfectly hardy, and capable of supporting the whole force of the summer heat and winter frost. Nothing, then, is lost by the system of natural reproduction, as must be the case when a forest is cut down to be replanted; for not only in the latter case is there a degradation of soil from exposure, but also a dead loss in the production of woody material during the whole time that both the old crop and the young can remain on the ground together with mutual advantage.

But it is not only in the removal of the timber and the reproduction of the forest, that we ought to study the action of nature. It is equally necessary that we should do so in the felling for improving the growing crop, or as they are commonly called, thinnings. To understand this, let us glance at the constitution of a high timber forest, in its natural state, that is to say, a forest, whatever be its age, springing from seed, and therefore capable of living and thriving through a long series of years. In such a forest the trees will, when young, form an almost impenetrable thicket of various heights; later on, they begin to assume a definite form, and being in close contact with each other, they soon begin gradually to lose their lower branches, which fall off and wither; but as a compensation, they throw all the vigour of their growth into their heads; and as these push themselves upwards, seeking the light of the sun, the stronger ones overtake the weaker, so that a certain number of the latter perish and disappear each year. When about half their full age, the trees will have attained their full height; but from that time till they arrive at maturity they go on always augmenting the diameter of their stems, but at the same time

decreasing in number; so we may calculate that, if 1,600 trees of 4 in. in diameter can stand and thrive on an acre of ground, there will not be above 400 when the trees are 8 in., 200 when they have attained 12 in., and from 100 to 140 when they are 16 in. in diameter. In our thinning operations, then, these considerations should be our guide. In the early stages of a forest's growth, there is little to be done except to keep the heads of the young trees of the most valuable species from being overtopped by those which stand near them; and this can be best done, not by removing the others, but by cutting off or breaking their tops; for it is in this stage that the process of natural pruning is going on, which nature does so much better herself than we can do it for her, and to this end it is necessary that the trees should grow as close as possible together. Later on, when the trees have taken a more regular form, we can assist nature, and, at the same time, save much valuable produce by judicious thinnings, which should be arranged so as to pass through the whole forest at intervals of from ten to fifteen years, so that the whole area may be operated on in turn. In executing these, the most delicate of all forest operations, it will be well to remember that their object is to give room to the heads of the trees, and not to their stems; for the stems will never be too close together, as long as the heads have room properly to develop themselves. The details, however, which govern the operation of thinning differ for almost every species of tree operated on, and to touch on them would be to enter upon a whole course of lectures on forestry. It will be enough to say here that, in every case, the favouring of the most promising trees, and the removal of the weaker ones, together with the preservation of continuous shade to the surface of the ground, while all the trees have

sufficient room to grow, should be the object aimed at.

The second point to be considered is the administration of forests from an economic point of view, or with reference to the revenue to be derived from them.

Now, the basis on which all sound forest management depends, is the revenue which any forest can be made to pay—that is to say, the income which it will produce in proportion to the volume of the standing trees; or, in other words, its capitalized value. This principle has been accepted as the base of the science, equally in the French as in the German schools, which, differing considerably, as they do, in the details of forest treatment, both start from this same point. To this end a forest should be considered as so much capital, represented by so many cubic feet of wood; while the amount of wood produced each year, by its growth, represents the interest thereon, and, in fact, is the revenue of the forest. It is evident that it is possible to cut and remove every year a quantity of timber equal to this annual increase of wood without diminishing the volume of the standing crop. The quantity that can be so removed is the proper yield of the forest—that is to say, the continuous yield; and French foresters have called it “the possibility”—or possible annual yield—of the forest.

Now, if we suppose that a period of 150 years will be required for the youngest trees in a forest to arrive at maturity, it is evident that the 150th portion of it might be felled every year, and that the increase of timber in the rest of the forest would equal the volume taken away. But, as we cannot apply such a plan in practice, and at the same time ensure the reproduction of a high timber forest, we arrive at the possible annual yield in another way.

1st. In order that we may have to deal only with areas of a work-

able size, the forest is divided, in the first place, into large blocks, or divisions, which should not be more than 2,500 or 3,000 acres each, and arranged generally so as to be convenient for the roads, rivers, or other means of transport for the timber. Each of these must be considered, and dealt with as a separate forest by itself; and to each a period is assigned, in which the whole of the present crop of trees will be removed, and the youngest now on the ground will have come to maturity. This will be about 200 years for oaks, 120 to 150 for beeches and Scotch firs, and so on. These divisions are again subdivided into (usually) four or five working subdivisions, or compartments, to each of which a sub-period of thirty years or thereabouts is assigned, as being sufficient for the removal of all the old trees in it, and the reproduction of the new crop. There must be, then, as many sub-periods in the number of years assigned for the complete working out of the forest as there are sub-divisions in the whole forest. We take whichever of these sub-divisions contains the greatest number of mature trees, and assign to it the first sub-period of thirty years, calling it No. 1. We count and measure the trees in it (neglecting all, if there be any, of less than 4 inches in diameter) and ascertain the total volume of timber they contain. This, divided by thirty, or whatever is the number, the number of years in the sub-period will give, as is evident, an amount or volume of timber somewhat short of the possible annual yield, but near enough to it for all practical purposes; it remains, then, only to remove, each year, from this compartment the quota of timber indicated above, following, in doing so, the method for the reproduction of forests explained just above—that is, we should remove one-fifth of the trees from one-sixth of the surface of the sub-division each

year, or thereabouts; taking care not to exceed the volume indicated as the possible annual crop.*

The other sub-divisions or counter-arts will be numbered 2, 3, 4, &c., and to each of them a sub-period will be assigned in succession. In the meanwhile, the necessary thinnings and the removal of trees that would otherwise perish, must be carried on continually during the first sub-period in all the other sub-divisions, so as to go over the whole ground at regular intervals, not exceeding fifteen years each. At the conclusion of the first period, No. 1 will contain a young crop of trees, from one to thirty years old; and then No. 2 will be taken in hand; and after No. 2, then No. 3, and so on until, in the full period, the whole forest will have been renewed without the ground having been once entirely cleared of trees. Any one visiting Baden Baden will do well to explore the forests in the beautiful valleys of the Oos and the Murg, in its immediate neighbourhood, which furnish a splendid example of the successful working of forests on this system. These forests are easy of access, being on the high road to Switzerland, and I mention them on that account. As examples of private forests, which have been admirably managed in the same way, I may mention those of Prince Furstenburg, near Rippoldsau, to the east of Baden Baden, where there are some excellently constructed and most ingenious devices for bringing timber down the mountain torrents to points from which it may be carted away.

But, besides forests which spring

* Trees cannot be made to grow spontaneously in a forest, as we can place the men on the squares of a chess-board. The distribution of the fellings, must therefore really depend on numerous cultural exigences which develop themselves from time to time, which time will not admit your noticing here.

from seed, there are others which consist of shoots springing from the stools or stumps of trees which have been felled, and which are commonly called coppiced forests. In many cases these give very good returns for hop-poles, mine-stays, bark, and other purposes for which large timber is not wanted. Their management is well understood, and the only points on which suggestions may be offered, are:—

1st. The necessity of giving sufficiently long intervals between each felling, as every time the copse is cut the soil suffers from exposure, and its fertilizing power is wasted, as it is also by the production, during the first four or five years after the cutting, of a mass of useless grass and leaves, which profit nothing.

2nd. The necessity of using sharp instruments for felling, and cutting the wood close to the ground, leaving the stools or stumps of such a form that the wet may run off them. These precautions are necessary for ensuring healthy re-shoots.

3rd. The cutting of the copse, if possible, in the early spring instead of in the winter, as is usually the case. If the work is done just before the sap begins to move, the shoots are made at once, before wet and rot have attacked the stools, and rendered the production of healthy, vigorous shoots impossible.

It may be added that the more standard trees that are reserved in a coppiced forest, the greater will be its value; and there is nothing to prevent their flourishing over the lower growth, which serves to keep up their heads, and to give them a clean stem.

Now, what is the practical application of all this? We have in Scotland about 800,000 acres of forest which have been planted during the last hundred years, for few of them exceed that age. Besides these, there are a small remnant of the old natural forests in

Strathspey. In England we have, belonging to the Crown, about 50,000 acres of forest, the greater portion of which has been planted within the last 100 years also, with some remnants of the old natural forest, chiefly in the New Forest. It is impossible to speak too highly of the admirable work done by the able men who have created these forests at Scone, Blair Athole, Dunkeld, in Strathspey, on the Findhorn, and at Beaully, in Scotland, as well as in some of the English Crown Forests. In our Colonies, including India, there are millions and millions of acres of forest land, some of which is of the greatest value, so that Great Britain is, perhaps, the country most richly endowed in forest wealth, of all the countries of the earth. Every one, not only in our own country, but elsewhere, is interested that all this great forest wealth should not be wasted or frittered away by a single generation of men. But, nevertheless, what is the future of all the forests? I have visited many of them, and scarcely anywhere did I see any of that young growth which are the links uniting the forest now on the ground with that of the future. Can any one say, then, that the future of these forests is assured? As at present they exist, one of two conditions must befall them. Either they will be cut down and the timber sold, or they will in due course perish naturally, and disappear of themselves. In either case the result is deeply to be deplored, for when once a forest disappears, it can only be replaced at a great expense of time and money.

It is for this reason that I am here to advocate the establishment—be it on the smallest scale even, to commence with—of some system of national instruction in scientific forestry. Hitherto, we have been entirely dependent on Continental schools for this training, and at the present moment we have officers of

the French forest service, who have been lent to the British Government, at the head of the forest administrations both at the Cape of Good Hope and at Cyprus. It seems, then, time that some stir should be made to help ourselves in this matter. It would, perhaps, suffice at first to establish a course of lectures on forestry at one of our public educational establishments, at which young men desirous of following a forest career might attend; provision being made for their instruction in practical work, if possible, in our own Crown forests, but otherwise, in some of the State forests on the Continent. It might be hoped that the Indian and Colonial Governments would, as an encouragement, place some appointments in their forest services at the disposal of young men so educated.

As a proof of what has been already effected in India by the forest officers educated in the Continental schools, I may mention that in that country there are at the present date 9,820,000 acres of reserved forests, the whole of which are managed generally on the principles above detailed, and 2,493,000 of which are protected from fire, as well as cattle and sheep grazing, and, consequently, are now in a condition to reproduce themselves under the natural system; and as, perhaps, the most convincing proof, from a practical point of view, of the value of the system, I may add, that the forest revenue of India, which in 1870 was only £357,000, with a net revenue of £52,000, in 1880 reached £545,000, with a net revenue of £215,000. That is to say, the revenue had increased 56 per cent., while the charges had only increased 8 per cent.

In South Australia a serious commencement has been made in the right direction also. By an Act passed in 1873, the sum of £2 per acre is paid to landowners, in certain

districts of the colony, to form plantations of trees. In 1875, a Forest Board was constituted, as certain districts of the colony were formally defined as forest reserves. In 1878, a Forest Act was passed, and a conservator of forests (Mr. Brown) was appointed. Last year, about a quarter of a million trees were planted out, and the forest revenue amounted to £6,517—of which £1,380 was for timber

sold—against an expenditure of £6,200.

If, then, so much has been done by the Indian and Colonial Governments to secure the future of their forests, can nothing be accomplished at the head-quarters of the Empire? This is the question now before us, and I trust that it may be answered by instituting a course of instruction which may eventually develop into a forest school for Great Britain.

[The discussion which followed will appear next month.—Ed.]

FOREST DESTRUCTION IN AUSTRALASIA.

THE complaints that have been made of the great destruction of forests for the sake of timber in America and Canada are now being heard at the Antipodes. There seems to be no system of forestry as in Germany and France, so that great waste is caused by the indiscriminate cutting of careless squatters and lumbermen. They now find in Australia that the great destruction of trees has had a most important effect on the climate, and that the rainfall and consequent supply of water has materially decreased. The same state of things has been felt in New Zealand, for during the past ten years the destruction of forests has been going on at the rate of twenty per cent. Drought not only means in these climates enormous loss of stock and crops, but it means increased dry fodder for the bush fires, which cause such devastation. It has been found necessary in some of the American States to make it compulsory on all new-comers to plant a certain number of trees in proportion to what they cut down. Something of this sort has been suggested by the Surveyor-General of South Australia, but it will be done on a wholesale scale. Blocks of 200,000 acres will be planted and cared for over a course of twelve years at a cost of about 15s. an acre, while the thinnings would produce after five years about 6s. an acre, and at the end of twenty-one years there would be a valuable property that, apart from its good effect on the climate, would represent a large profit on the original outlay. No doubt much smaller plots than one of 200,000 acres would be more easily made, and we hope to hear of some steps being taken at once to counteract the serious drought from deforestation.—*Land and Water.*



ENGLAND.

THE work of planting in the woodlands will now have been brought to a close, and all produce of the falls should be cleared out as rapidly as possible. Whatever can be conveniently backed out to the clearance roads should be so removed, in order to prevent the damage to the stools which is certain to be caused by horses and wheels, as soon as the sap begins to rise. The forester should go through the falls and pay great attention to the cutting, seeing that all stools are well rounded off so as to provide no lodgment for water. Holly, yew, laurel, and some other kinds may still be planted out if they are not already removed. But with these great care should be taken not to allow the roots to become dry, or to be long exposed.

Proceed with the marking of oak, as, owing to the prospect of an early spring, bark-stripping may soon commence. Have everything in readiness so that the work may proceed without interruption when it is once begun. A repetition of the details of this operation are unnecessary here, as they were given at some length last year. To ensure easy stripping and the best quality of bark, fall the trees as soon as possible after they come into bud. After the trees come into full leaf there is a considerable loss in weight and a great deterioration in quality. This is sometimes known to amount to as much as ten per cent. Insist upon the use of the saw in felling, and cut low. Cut round carefully and neatly near the ground to ensure a free growth of buds from the stool. Lay aside the body-bark for covering up or thatching-in the smaller bark from the branches. Peel the smaller branches down to an inch in diameter. With fine weather about fourteen days in stack, even without turning, should make the bark fit for delivery to the tanner.

The probable weight of bark may be calculated with a tolerable degree of certainty, by observing the following data:—A vigorous tree, well grown and with a good head, will yield about 6 cwt. of bark for every ton of measurable timber. Trees averaging about 10 ft. each will give a ton of bark for every 150 ft. of measurable timber.

Trees growing singly, such as those in hedgerows, are sometimes known to yield at the rate of a ton of bark to three tons of measurable timber. The yield of bark from timber grown in plantations will depend upon the thickness of the planting. If the trees stand thickly upon the ground the bark will be thin and light, while with ample room a ton of bark may be reckoned upon for every four or four and a half tons of timber. Small oak poles will yield a ton of bark for every five tons of timber.

The work of the nursery will now be heavy. All seedlings should be transplanted as soon as possible. Put out Scotch firs which have been two years in the seedbed. From 12 to 24 in. between the lines, according as they are to be horse or hand-hoed, and 6 in. from plant to plant, will do for these. Also transplant spruce and silver fir. Sow coniferous seeds of all kinds. These are best sown by scattering them over the surface of beds which have been lightly rolled down, and riddling a proper depth of fine soil over them.

If frosts continue, cover up seedbeds of ash, beech, sycamore, and chestnut, and protect seedling spruce, silver fir, larch, &c. Small branches stuck thickly into the beds will answer this purpose well.

Grafting forest trees may now proceed, as this adds beauty to woodrides and the borders of plantations at a small outlay. Healthy young stocks should be selected for this purpose.

Sow gorse seed, either for hedges or game cover. For the latter purpose about 24 lbs. per acre will be sufficient. A good seedbed should be obtained. Light sandy land will be found well adapted to this. Also sow down woodland rides or open spaces which have been cleared of trees. A good mixture for this purpose was recommended a year ago, and it consists of—

Timothy grass, tall fescue, hard fescue, and meadow foxtail,

2 lbs. of each 8 lbs.

Rough cocksfoot, and smooth-stalked meadow, 4 lbs. each... 8 „

Sweet-scented vernal and rough-stalked meadow „ ... 8 „

Wood-meadow grass 8 „

Total ... 32 lbs.

A. J. BURROWS.

Pluckley, Kent.

SCOTLAND.

WITH the very favourable weather we had last month, planting should now be all but completed. Notch planting on moorland may still be continued to at least the middle of the month; but it is advisable to complete the work at the earliest possible date, and rather than continue it much later this season it would be better to defer all arrears till autumn.

General forest thinning will now be completed, and any timber not yet removed from the woodlands should now be cleared out, and all roads which have been cut up with the winter's work repaired and dressed off.

On account of the stormy character of the weather during the winter months, there must have been damage done, to a greater or less extent, in most of the forests and plantations throughout the country by the uprooting and breaking of trees and branches. Where practicable all available time this month might be occupied in having such trees and branches removed and disposed of to the best advantage. It is better to have all broken branches cut down before the buds begin to expand.

Towards the end of the month attend to all necessary preparations for oak-barking, which may be expected to begin early in May. Look over the division to be operated on, and if convenient mark all trees to be removed.

In the Nursery, the transplanting and lining in of seedlings, &c., should be completed as soon as possible. Dig between the lines of undisturbed transplanted plants, so as to destroy weeds, check an over luxuriant head growth, and promote a fibrous root growth.

Complete the trimming of evergreen shrubberies and hedges, and fill up all gaps in the same.

Clean policy grounds, edge roads and walks, and remove all suitable refuse to the compost heap.

Continue groundwork improvements, completing all those works which may in any way interfere with the cropping or pasturing of arable lands.

D. SCOTT.

Darnaway, N.B.

IRELAND.

THE past unprecedented mild and open winter has left no arrears of work. So that planting young trees and transplanting those of a larger growth must now be well-nigh finished. Where this is not the case, it would be well to postpone all further planting till autumn. However much we may cling to spring planting as a matter of practice, plants put down in autumn do much better in this country.

Thinning young plantations ought also to be finished, as when performed late in spring there is the risk of injuring those trees intended to be left. The thinnings should be removed from among the trees, burned or sold off.

Every preparation ought to be made to begin the stripping of oak bark. An early rise of the sap may justly be anticipated this season. It is

well to commence taking off the bark as soon as it can be done; the early bark is the best. In stripping, the bark ought not to be hammered, but taken off in whole lengths of about 30 inches. This can easily be done by cutting it into suitable lengths, then inserting the peeling iron and working it round the tree until the lengths rise freely off.

The bark, which must be previously cleaned of moss, should be placed on drying stands to season. Care should be taken to keep the inner side downwards, otherwise it will get discoloured, which will reduce its price in the market. After it has stood a few days on the drying stand, the bark can be built into a rick. A very convenient form of rick is one eight feet wide at base and tapering to a narrow ridge. This plan enables each addition which may from time to time be added to the rick to be completed, obviating the necessity for waterproof covers. If the bark be tolerably well saved on the stand and the rick built so as to prevent any possibility of water getting into its tube-like side, it may be kept for years without much injury. The price of bark has ranged about £5 10s. per ton of 20 cwt. in this country for the last six years.

Ballinacourte, Tipperary.

D. SYM SCOTT,

WALES.

WITH another month of fine open weather forest tree planting operations will have been completed some time ago. Evergreen trees and shrubs may still be removed with success, care being taken to have as much soil attached to the roots as possible. The roots may be protected by binding a mat round the ball, and keep them as short a time as practicable out of the ground. Plants that have been recently transplanted will require careful watering during dry weather. When large plants are removed it will be necessary to have them secured by staking, &c. The thinning and cutting of hardwood trees will also have been finished, although young fir plantations may still be thinned with advantage. In thinning young fir plantations it is advisable to remove all the branches, &c., as the work proceeds.

Should the weather continue favourable, bark stripping will have to be commenced during this month. Under such circumstances it will be necessary to finish up as much odd work as possible, and have everything in readiness for a good start.

Where vacant ground in the nursery has not been filled up, no time should be lost in having it done. Grass lawns and walks will require mowing and rolling.

Kimmel Park.

LEWIS BAYNE.



THE appointment of Sir Henry Brougham Loch, K.C.B., to be one of Her Majesty's Commissioners of Woods and Forests, in the room of the late Hon. J. K. Howard, will be hailed with satisfaction by all who take an interest in the successful management of the vast public property committed to his charge. For about twenty years Sir Henry has been Governor of the Isle of Man, where he has displayed such indomitable skill and energy in the management of affairs, as to have raised that interesting island from a state of mediæval torpitude to one of great activity and enterprise, bristling with every invention of modern science and art. He instituted laws and an electoral parliament, in place of older forms, which had grown unsuitable for modern wants and customs; made harbours, railways, and roads, built public offices, and introduced every invention and appliance which was likely to benefit the people, or the numerous holiday sojourners who resort to the island for health or pleasure. In the office to which he has now been appointed, he will find ample scope for his great administrative experience and distinguished tact and skill in dealing with antiquated customs and wasteful habits. We look forward with great hope of seeing the Royal Woods and Forests in his hands managed in such a way as to make them really useful to the country and profitable to the State.

* *

Among the various species of exotic trees which thrive tolerably well in most parts of this country, the conifers from North-West America are perhaps more planted than all other hardy exotic trees introduced within the last hundred years. Their evergreen and stately nature, and elegant habits, have made them special favourites with the ornamental planter, and their use for decorative purposes is often carried to a ridiculous extent when they are seen crowded on the pincushion lawn of a suburban villa, where a dozen miserable "specimens" occupy the space which should be devoted to one. As a rule, conifers do not thrive well in close proximity to a town, and villa grounds can be much more appropriately planted and decorated with other subjects that will thrive luxuriantly in such places, and may be cut back, to keep them within bounds, without either injuring their health or spoiling their characteristic habit and effect. Nothing is more disagreeable to the eye than a rusty, sickly-looking, stunted conifer, occupying a spot where clumps or single plants of aucubas, laurels, hollies, rhododendrons, and a host of deciduous and flowering trees and shrubs would grow in perfect health, and afford a variety of colour and diversity of form which no collection of conifers can ever approach.

* *

Conifers are unmistakably "country trees," delighting in the open air.

and fresh breeze, far removed from the dust and smoke of busy cities. The decorative section find their most appropriate place in the extensive grounds and ornamental plantations around our country mansions, where they combine with a due proportion of broad-leaved trees in forming the nearest approach which man can make to a perfect landscape. In groups, or as single specimens, set off and contrasting with neighbouring belts, clumps, and single specimens of deciduous trees, their beauties are displayed to the greatest perfection. The rage for planting conifers, and conifers only, in every possible position in our pleasure-grounds, to the exclusion of far more suitable subjects, has about exhausted itself, and planters are returning to better taste and a more cheerful style by a judicious use of deciduous trees to relieve the monotony of the evergreens. In the composition of a landscape deciduous trees are no less indispensable than are evergreens, and especially so are those which annually display an abundance of lovely and fragrant flowers.

* *

From the great amount of interest displayed at the meeting of the Society of Arts, by those who attended the lecture delivered by Colonel Pearson, on the 1st of March, of which we give a full report in our present issue, we imagine that the establishment of a School of Forestry, with as little delay as possible, is one of the things that may be safely calculated upon. The large gathering of influential gentlemen who met together under the presidency of Sir John Lubbock, to hear Colonel Pearson read his paper on "The Teaching of Forestry" in Britain, was largely composed of those who can most effectually promote the cause of such an important branch of national economy. The lecture which they listened to must have convinced the most inexperienced of the great

necessity of this country possessing an institution for training foresters in the theory and practice of their profession. As so forcibly pointed out by the able and experienced lecturer, Great Britain is the only country of any note in the civilised world in which there is not an institution for the purpose of teaching Forestry; and yet there is no country in the world which so much depends on the wise management of its forest resources. We trust that the short-sighted policy which has hitherto guided our rulers in regard to this subject is now at an end, and that we shall soon be able to congratulate all who have worked so heartily in the cause upon the consummation of their praiseworthy efforts to promote the best interests of Forestry, and to ensure future welfare of this great empire.

* *

The discussion (the report of which we are compelled by want of space to hold over till next month) which ensued upon the reading of Colonel Pearson's paper showed in a remarkable manner the perfect unanimity which prevails among all who are either directly or indirectly interested in forestry upon the great necessity there is for the establishment of a Forest School in Great Britain. Professional foresters like Mr. Robinson agreed with such eminent men of science and statesmanship as Sir John Lubbock, Sir Richard Temple, General Strachey, Professor Thistleton Dyer, Professor Boulger, Mr. Rogers, and other speakers, in strongly supporting Colonel Pearson's suggestion that Government should create a training institution in this country to supply properly qualified foresters for the management of our forests at home, in the colonies, and in India; in short, to supply our own wants, and make us thoroughly independent of the aid of any foreign country. In forestry, as in every other branch

of science and art, foreign aid should never be a necessity, but simply an accessory to British education and training, and until such is the case, the Government will not have performed its duty to the country.

* *

The valuable report by M. Boppe, Inspector of French Forests, on the recent visit of the Professors and students of the French Forest School at Nancy to our British forests, is quite as emphatic as Colonel Pearson and his supporters in asserting that a Forest School is a pressing want in this country, and ably points out some of the many facilities which we possess for the creation of such an institution. M. Boppe and his brother Professors who concur with him in his report treat the subject with thorough impartiality, and give their opinion with a candour which merits our highest approbation, and which ought to command the immediate and earnest attention of the Government. We may not altogether agree with the views expressed upon some points in the report, but of this there can be no dispute, that the French Professors made remarkably good use of the short time they were in this country, and faithfully describe what they saw and heard. Had their time allowed them to make a thorough and complete inspection of the details of British forests and their practical management, they would probably have modified their opinions concerning the soundness of the system upon which forests, or plantations, are managed in this country on well-ordered estates. In general the system followed (in Scotland especially) pays, and has paid well. However, we could not expect our visitors to investigate matters of this kind in the course of their flying inspection; and we are assured that their remarks on our forests and their management will be as warmly accepted by our foresters and landowners as they are kindly and

generously given by M. Boppe and his travelling companions.

* *

We trust that our landowners will profit by the excellent suggestions tendered to them in M. Boppe's report, and take care that their woods and plantations are managed in a proper and systematic manner, so that they may give "a constant annual revenue and a constant improvement in production," which, Mr. Boppe justly remarks, is the only sound, economical principle on which all agricultural and forest property can be managed. When this primary rule is generally recognised and practised in regard to our woodlands, we shall find many more of our landowners entering warmly into the formation of plantations with a view to increase the annual revenue of their estates, as well as adding largely to the permanent value of the property.

* *

Our French visitors pay a high compliment to the skill and ability of the foresters with whom they came in contact in England and Scotland, which, we believe, is thoroughly deserved, and will in consequence be highly appreciated as coming from gentlemen who are so well qualified to judge. Particularly so must this be the case by the foresters on the estates in Scotland visited by the Frenchmen, where they found so much to praise and admire, and so little to condemn. If it was not so in the English forests it is from no fault of those in charge, but has arisen from the baleful system by which the Royal forests have been managed, or rather mismanaged by the Government for many generations.

* *

The Frenchmen appear to have been specially struck by the great variety of forest trees which thrive in Britain, and for the growth of which the soil and climate is so

favourable. In the same way, they remark upon the many large, old, and vigorous trees which they met with in all parts of the country through which they travelled, and which are by no means a common feature in the other countries of Europe.

* *

The most frequent fault they found was the want of any system of natural reproduction in most of the forests and plantations which they visited, and the general negligence in protecting our forests from the ravages of sheep and deer, and, we may add, hares and rabbits. In respect to the first of these faults, we quite approve of the suggestions of M. Boppe and his coadjutors, that much more attention should be paid to the natural reproduction of forests, as being in general the best and cheapest method of rearing them, and which must yet become the common method in large tracts of the country. We are aware that this method of rearing woods is practised with the greatest success on several estates besides those mentioned in the report, and now, since it is brought so prominently before landowners and their foresters, we have no doubt it will rapidly spread to all districts of the country where it can be profitably introduced.

* *

In regard to the exclusion of all browsing animals from young woods, we may remark that such animals can always be fed on vastly cheaper terms on grazing land, and that it is an utter waste of means to feed them on young trees. Sheep and deer, which are specially mentioned by M. Boppe, as well as horses and cattle, are comparatively easy to exclude from woods in a young state, by substantial fencing at no great cost; but the scourge of hares and rabbits which overruns so many of our woods is the great evil with which our foresters have to contend in the rearing of young plantations. These most destructive

and insidious vermin are difficult to exclude, and it is almost impossible to exterminate them on rough forest land, especially where game is so strictly preserved as it is on many estates. Till such times as landowners feel it to be to their interest to insist upon their officials keeping young woods clear of hares and rabbits, until then must the process of rearing young trees be costly and vexatious.

* *

The unrestricted pasturage of commoners' stock in the Royal forests has ruined their productiveness for ages, and M. Boppe justly condemns the policy which has led to the shameful waste of such a vast amount of national wealth. The strictures passed upon the lamentable condition of the New Forest are more than justified by the actual state of affairs, and ought to arouse the nation to a sense of the property utterly lost to the State by the rapacity of the commoners.

* *

We understand that Sir John Lubbock has not yet been able to secure a day for his motion for the appointment of a select committee to inquire into the state of the Crown forests and woodlands. We hope an early day may be obtained for the discussion of this important motion, which has for its object to render available for British landowners the experience of foreign foresters, and which should at the same time attract public attention to the national importance of a School of Forestry.

* *

The past winter will be long remembered as one of the most destructive on record to woods and trees. A succession of gales, each more destructive than another, have followed one another since the memorable 14th of October, which overwhelmed so many of the fine trees and plantations along the north-east

parts of England and the south-east parts of Scotland. Successive storms, more or less severe, have visited every part of the United Kingdom, and committed vast havoc among standing timber. The severe gale which visited London and the south of England on the 25th and 26th of March has left sad traces of its destructive force. In the neighbourhood of the metropolis many fine trees were blown down, and all over the southern counties, from Dover to the Bristol Channel, the storm was felt severely, and much injury done to trees and plantations. It appears, however, to have expended its greatest force about the mouth of the Severn and the country adjacent—the Forest of Dean and the Vale of Gloucester being swept with great

force, and thousands of trees uprooted. We shall be glad to receive reports of the injury done to woods and trees in those parts of the country visited by the storm.

* * *

We understand that at the examination held in London, in January last, of candidates for appointments in the Indian Forest Service, the following gentlemen were successful: Messrs. Barnard, Sweet, Hoghton, McIntire, Millett, Shepphard, Bell, and Hobart Hampden. We are glad to hear that they are an active, manly set of young fellows, and likely with proper training to make good foresters, although the actual number of marks obtained at the examination was slightly below the average.

THE BENGAL FORESTS.

THE results of the Forest Department in Bengal for the financial year 1880–81 seem to be creditable to all concerned. The area of the reserved forests was increased by 466 square miles, bringing it up to a total of 3,411 square miles. All the forest work was carried out under the supervision of but eleven officers of the superior ranks. The Lieutenant-Governor makes an earnest call for an increase to the number of officers. As the receipts of the Department have in the last ten years risen from Rs. 87,260 to Rs. 5,61,340, while the area of the reserved forests has risen from 106 to 3,411 square miles, the Government of India will probably see their way to comply with his request. The expenditure has necessarily increased too, rising in the same ten years from Rs. 67,405 to Rs. 3,35,381. It is remarkable that the surplus for 1880–81 was drawn from

the Sunderbunds Division. This Division alone furnished a surplus of Rs. 2,10,065 out of a total surplus for the whole Department of Rs. 2,25,959. This large profit was realized almost entirely from the sale of small wood and fuel removed by purchasers from the forests.

The Diamond Harbour State Railway wanted 4,000 broad gauge sleepers, but so many could not be supplied. The officer in charge was told to supply 1,000, and furnished 694, at a cost to the Department of Rs. 3-12 each, the selling price being Rs. 4-8 each. This leaves only twelve annas per sleeper as profit, or not quite 3½ annas per cubic foot, which, when the value of the wood is taken into consideration, is practically *nil*, and if a percentage of the salaries of the officials employed in supervising this particular work is debited to the cost of the sleepers, the transaction was, commercially

speaking, a loss. Allowing that the transaction was a small one, it adds another instance to the many, that Government cannot compete in work like this with private enterprise. The Forest Department has made great strides in the last few years, and it justifies its existence; but it would do well to see if it cannot devise some plan for making over work, such as conversion of wood into logs, planks, and sleepers, to private contractors. It ought not to be difficult for officers of the Department to draw up such rules, and to devise such checks, as would admit of its making over tracts of forest to contractors, who would prepare wood for the market, and for such demands as those made by railways. It is interesting to note that, in accordance with certain suggestions made by Dr. Brandis, fuel is calculated "at 100 maunds firewood, equal to 175 cubic feet of solid wood, and at 100 maunds of charcoal, equal to 700 maunds of solid wood." Adopting this rule, we find, if we understand the figured statements in the body of the report, that about 173 lakhs of cubic feet were sold as firewood, charcoal, and in green trees, besides 3,700 trees and some 5,000 planks and pieces. All this large quantity of stuff, besides 155 lakhs of bamboos, was removed from the forests by the purchasers themselves.

Including money paid for a large number of canes and a quantity of small products removed in the same way, the Department realized for all these articles Rs. 3,96,000. Including, we suppose, proportional charges for the establishment, protecting, and supervising the work and

forests, the charges were Rs. 96,000, showing a surplus of Rs. 3,00,000, or 312 per cent. The Department cut up and brought to depôts for sale, wood, in logs of superior kinds, and in fuel, a total quantity of 13½ lakhs of cubic feet. For doing this it paid Rs. 1,28,000, and sold the stuff for Rs. 1,65,000, yielding a surplus of Rs. 37,000, or a profit of barely 29 per cent. As the total expenditure on establishments was, as stated elsewhere in the report, Rs. 1,46,000, of which Rs. 96,000 were debited to looking after forests, from which the public took away direct what was brought, the profit on depôt sold wood was less than the cost of supervising it by Rs. 15,000. Of course the Department sold its wood at a higher price by bringing it to depôts, presumably nearer the eventual consuming market, but it had to pay for that carriage, and we again assert that it would pay the Department better to sell standing trees than to do so much conversion and transport work itself. The figures are also interesting, as showing that the Forest Department must look more to the demands of the million than to the occasional individually larger demand of the few. It may be necessary, or rather convenient, to have a few logs wanted, perhaps suddenly, by some other Department; but the true policy of the Forest Department is to provide the trees, let them be felled and taken away, as speedily as possible, by private agency; and then, closing its worked tract, apply its science and skill to again covering it with trees, or other forest produce as may be thought best.—*Indian Agriculturist*.





EARLY-FLOWERING RHODODENDRONS.

SIR,—In the notice of early-flowering rhododendrons, on page 816 of your last number, no mention is made of perhaps the best early *white* rhododendron yet introduced—I refer to *Rhododendron nobleanum album*. This is a very desirable variety of the well-known *R. nobleanum*, and deserves to be much more extensively cultivated than it yet has been. It flowers as freely and is quite as hardy as the common variety; in fact, it seldom fails to open its beautiful clear white flowers even in the worst of seasons. It is earlier and superior in every way to “Cunningham’s Dwarf White,” *R. caucasicum album*, and it will stand uninjured through as many degrees of frost. *R. ciliatum* is another kind that deserves notice, as it flowers profusely, and in moderate seasons makes a fine show with its small but numerous whitish, sweet-scented flowers. It is the best of the early dwarf white rhododendrons, and in a sheltered situation it thrives well. A south-west aspect, protected from the morning sun, is the best for these early-flowering rhododendrons.

J. DOUGLAS.

March 14, 1892.

MUTILATION OF AN HISTORICAL TREE.

SIR,—Being recently in Edinburgh, I strolled out one evening to view the ruins of the historical castle of Craigmillar, which for a time was the residence of the lovely but ill-

fated Mary Queen of Scots, and with which, and its surroundings, the name of Queen Mary is inseparably connected. A friend who accompanied me pointed out many well-known objects of interest, popularly at least associated with Queen Mary. Among others, I was shown a grand old sycamore or “plane tree,” as my friend called it, which for centuries has stood in the footpath of the old road from Edinburgh to Dalkeith, and beneath which it is said that Queen Mary often sought shelter in the heat of the day when residing at Craigmillar. Be this as it may, the tree is of great size, and when untouched by the ruthless hand of man, it must have presented a noble and venerable appearance, worthy of its name: “Queen Mary’s Tree.” Alas! however, through the misguided officiousness of some petty professor of the art of forestry, the tree has been most shamefully mutilated, and completely shorn of all its natural beauties. The pruning saw has been used with a vengeance! and limbs of more than a foot in diameter have been mercilessly amputated, till the noble head is an unsightly mass of snags and stumps; and a magnificent tree, which might have lived for ages to come had it been properly treated, is now hopelessly ruined. I turned in sorry and disgust from such an exhibition of man’s crass ignorance and pitiable taste. What is the Scottish Arboricultural Society doing, when such a miserable performance could happen under their very nose? In Scotland, at least, I expected to find trees skilfully treated by men

who understood and practised the arts of forestry, both cultural and conservative.

EXPERTO CREDE.

Brighton, March 11, 1882.

SAWDUST FOR BEDDING.

SIR,—In reply to "Subscriber's" letter in last month's *Journal of Forestry* (p. 824), regarding sawdust as a substitute for straw for bedding, I beg to state my experience.

We have used it for a number of years at Taymouth as bedding for the dairy-cows, the horses at home farm and young horses in loose boxes, and never found that it injured the animals in the least. We use the dust of all kinds of wood (fir among the rest) sawn at the estate sawmill, and prefer it *dry*. The wet bedding *only*

is removed from the stables, and byres daily, and mixed in the dung-pit. It absorbs a large quantity of liquid manure. We have used this manure for root crops and for top-dressing pasture lands, and always found it produced good crops. Care, however, must be taken to remove as little dry sawdust from the stalls as possible unless there is enough liquid manure in the pit to soak it thoroughly.

WM. DUNN.

*Mains of Kenmore,
Aberfeldy, N.B.*

CONIFERÆ AT FONTHILL ABBEY, WILTS.

THE following are the measurements of some of the Coniferæ growing on the above estate :—

Name.	Height	Circumference 5 feet from ground	Spread of branches	Remarks.
	ft. in.	ft. in.	ft. in.	
Thuja gigantea	51 6	4 2	20 0	} Group
	55 7	4 11	18 6	
	53 3	4 3	19 3	
Cupressus macrocarpa	45 10	4 3	—	} Group of 6
Pinus excelsa	34 7	3 5	—	
Abies Menziesii	49 1	3 9	27 0	
„ Albertiana	44 0	2 1	19 0	
„ morinda	25 6	1 10	16 8	
„ Douglasii taxifolia	66 4	5 8½	33 0	
Picea lasiocarpa	39 4	2 10	16 4	} Group of 4
„ Bracteata	34 0	2 3	20 0	
Taxodium sempervirens	44 8	5 5	19 0	
Cryptomeria japonica	50 5	4 5	23 5	
Picea nobilis	34 8	1 11	14 0	
Cupressus Lawsoniana	49 0	2 11	13 7	
Wellingtonia gigantea	59 7	8 9½	19 6	
Picea grandis	42 2	2 2	16 6	

Many of the above were measured last year, and some have made a growth of from 2 ft. to 3 ft. The measurements of the above Wellingtonia in 1879 were 54 ft. 9 in. high, with a circumference of 7 ft. 5½ in.

at five feet from the ground, and a spread of branches of 18 ft. 4 in. In conclusion I may say that it is quite a common thing for *Abies Douglasii* to make a growth of 3 ft. in a season.
J. R. WEST, Forester.

LARGE *ARAUCARIA* *IMBRICATA*.

SIR,—At Duart Castle, in the island of Mull, there is a fine specimen of the *Araucaria imbricata*, which on being measured lately was found to be of the following dimensions:—Height 82 ft.; girth at one foot up, 6 ft. 9 in.; at three feet up, 5 ft. 10 in.; at six feet up, 5 ft. 6 in. The tree is a female, and about ten years ago it seemed to stand still and made little or no upward growth for some years, but for the last few years it has again shot upwards and is making a good growth. The height of the tree is not remarkable, but the stem is the largest in girth that I know of in Scotland. Can you or any of your readers tell me if there is an araucaria in Scotland with a stem girthing more than this? Also, will some of your correspondents kindly inform me where in Scotland the highest araucaria is to be seen growing, and what are its dimensions?

J. F. S.

Oban, March 24, 1882.

BEECH *versus* HORNBEAM HEDGES.

SIR,—As beech hedges did, especially in 1879, suffer very severely, in many parts of the country, and are thought to be dying out, it may not be out of place to suggest that some of the readers of the *Journal of Forestry* should in its pages state their opinions as to the best substitute for beech for hedging purposes. I believe that not a few different species of plants might be named as worthy of taking the place of the beech; hornbeam, for instance, might probably be one. In our home nursery here we have some very fine hornbeam hedges, fully 7 ft. high; they are strong, and remarkably close, notwithstanding they are very much

exposed, and the soil not the best, a red clay resting on limestone.

I have seen other hornbeam hedges, growing in different parts of this county (Kilkenny) varying from 5 ft. to 7 ft. high, and constituting excellent protection both against sheep and cattle. Hornbeam evidently accommodates itself to various kinds of soil and situations, and can be grown with perfect success upon high and exposed places, and judging from what I have seen here and elsewhere, I consider it makes a very good and substantial fence and would prove an excellent substitute for beech.

JOHN M. FORSYTH,
Wood Manager,
Gowran Castle, Co. Kilkenny.

PINES AT OATLANDS, NAVAN, IRELAND,

SIR,—At foot I send some pine measurements. They are not long planted, I think about twenty-two years, so cannot be anything very wonderful, but still show good growth.

	Height.	Ground Girth.	Girth 5ft. up.
Cedrus	ft. in.	ft. in.	ft. in.
Deodara	38 0	5 5	4 2
"	37 0	6 0	5 4
Cryptomeria	29 3	5 4	4 5
P. Douglasii	54 0	3ft. up 6ft.	—
Araucaria	28 10	3 0	—
"	23 0	Circuit of branches.	—
"		48 0	—
P. nobilis	25 0	2 4	—
"	37½ 0	4 0	—
Lambertiana, diameter of branches 47 ft.			

G. POLLOCK.

March 10, 1882.

USE OF CARBOLIC ACID IN FORESTRY AND NURSERY GARDENS.

SIR,—With reference to the notice in the *Journal of Forestry* for March, 1882, I think it well to call attention to the fact that the

employment of carbolic acid—as it might naturally be supposed—is in a high degree detrimental to the growth of seeds.

The experiments which I made last autumn, purposely, in a room of low temperature, gave the results recorded below. The germination proceeded slowly, and I should have

continued my observations longer if the seeds in sections number 10 and 12 had not been devoured by mice.

I think that the knowledge of this experiment may preserve many readers of your *Journal*, who might be tempted to steep their seeds in carbolic acid before sowing them, from serious loss.

a. Scotch Fir Seeds of One Year.

	Without carbolic acid.	10 minutes in a solution of 1 per cent.	10 minutes in a solution of 5 per cent.	1 hour in a solution of 5 per cent.
	Per cent.	Per cent.	Per cent.	Per cent.
In blotting paper	(1) 50	(4) 29	(7) 0	(10) 0
In Nobbe's apparatus.....	(2) 59	(5) 18	(8) 10	(11) 0
In flannel	(3) 56	(6) 53	(9) 23	(12) 23

b. Red Clover of One Year.

In blotting paper	(13) 79	(16) 0	(19) 0	—
In Nobbe's apparatus.....	(14) 84	(17) 0	(20) 0	—
In flannel	(15) 86	(18) 73	(21) 21	—

Duration of the experiments, four weeks.

Darmstadt.

GUSTAV HICKLER.

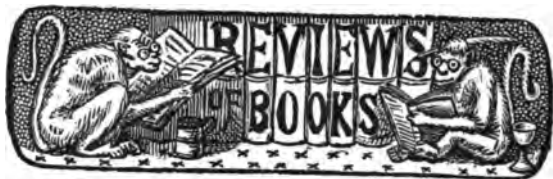
THE METEOROLOGICAL SOCIETY.

THE usual monthly meeting of this Society was held on Wednesday, the 15th ult., at the Institution of Civil Engineers, 25, Great George Street, Mr. J. K. Laughton, F.R.A.S., President, in the chair. The following gentlemen were balloted for and duly elected Fellows of the Society:—W. Aronsberg, J. P.; W. G. Birchby; J. Rand Capron, F.R.A.S.; P. Crowley, F.Z.S.; W. W. Culcheth, M.Inst. C.E.; D. Cunningham, M.Inst. C.E., F.S.S.; S. Cushing; W. N. Greenwood; E. Kitto; J. Mansergh, M.Inst. C.E.; G. Oliver, M.D.; H. S. H. Shaw, Assoc. M.Inst. C.E.; G. W. Stevenson, M.Inst. C.E., F.G.S., and W. H. Tyndall.

The Papers read were (1):—"Notes of Experiments on the Distribution of Pressure upon Flat Surfaces perpendicularly exposed to the Wind," by C. E. Burton, B.A., F.R.A.S., and R. H. Curtis, F.M.S. In the present state of *aëro-dynamics* it seems to be impossible to make an *a priori* investigation of the distribution of pressure on a surface

exposed to the impact of the fluid in motion without introducing such limitations as render the solutions arrived at widely divergent from the results obtained by the experiments hitherto made. The authors therefore proposed to themselves to attack the problem from the experimental side only, by a method which, as far as they know, has not been applied in the case of air, viz., the application of Pitot's tube suitably modified in form to the simultaneous measurement of the pressures at the centre, and at any en-centrally situated point of a pressure-plate of known dimensions. The results of the preliminary experiments are given in the present paper. (2) "The Principle of New Zealand Weather Forecasts," by Commander R. A. Edwin, R.N., F.M.S. (3) "The High Atmospheric Pressure of the Middle of January, 1882," by H. Sowerby Wallis, F.M.S.

The Electrical Thermometer, lent by Messrs. Siemens Bros., for observing the temperature of the air at the summit of Boston Church Tower, was also exhibited.



The Indian Forester. VII., No. 3. Calcutta.—In the present number there is an interesting account of the forests of the Dhauli Valley in Garhwal, in the Himalayas. These forests are of considerable extent, and contain a good proportion of valuable deodar, along with firs, pines, oaks, and other useful timber, for which the demand is sure to increase as the country is opened up. The effort of the Dutch to establish forest conservancy in the island of Java forms the basis for a short account of the teak forests of the island, which are roughly estimated at 2,160 square miles, and still contain much valuable timber, although in former times, and till quite recently, it had been sadly wasted. The revenue derived from the collecting of Myrabolams, in the Kolhapur state, forms the subject of an interesting article by "Native Forester." The forests and Forest Department of the Cape Colony, and the training of forest officers for India, are short but readable articles; in the latter of which we note that at last the primary point is yielded, for which we have always contended, that it is both possible and *practicable* to train these forest officers at home. Twenty pages of "extracts" from the Kew report for 1880, presents a rather heavy dish of stale information, which most readers will feel inclined to skip. A description, with an illustration, of Fleischmann's "Spiegel-Hypsometer," furnishes the reader with a good idea of that useful instrument for measuring the heights of trees, &c. The fact that the deodar ripens its seed within a

year from the time when the cone first appears, is clearly demonstrated by Mr. A. Smythies, from his own observations in the forests at Jaunsar-Bawar, in the North-West Provinces. Some English oaks and larches were planted in 1877 in the forest garden at Manali, in Kulu, at an elevation of about 6,500 ft., in the Western Himalaya. The oaks have thriven remarkably, producing annual terminal shoots from $3\frac{1}{2}$ ft. to 5 ft. in length. Many of the larch died out, but of the three measured by the reporter the terminal shoots extended from $3\frac{1}{2}$ ft. to 4 ft. in length. Dr. Brandis records the extraordinary durability of teak, in the discovery of planks of that timber, about $1\frac{1}{2}$ in. thick, in a good state of preservation, among the ruins of the old city of Vijayanagar, on the banks of the Tungabhadra river, in the Madras Presidency. The building (the Vitala temple) in which the teak planks were found is said to be at least 500 years old; the city of Vijayanagar having been founded about the middle of the fourteenth century by Bukka and Harihara, the first kings of the Vijayanagar dynasty. Various short articles, and lengthy extracts from official papers of more or less interest, with liberal clippings from contemporaries, particularly from the *Timber Trades Journal*, go to make up the bulk of an average number of the *Indian Forester*.

THE March part of the *Florist and Pomologist* contains plates of the double flowering Wistaria and a group of tempting desert cherries.

"Vine Culture" is concluded in this issue; the "Register of Novelties" is continued, and the usual amount of descriptive articles form the rest of the contents.

Forest Songs.—We have received from Messrs. Kegan Paul & Co., a small book, neatly printed, entitled "Forest Songs and other Poems," by Mr. John Todhunter. There are some fifty poems and sonnets in the collection, half of which treat of the forest. We quote one or two verses which will, perhaps, show the style of the author; and we need only add that the collection here published will please many who take an interest in the grand mystery of forests and poetry, which, according to the writer, attaches to them:—

"Deep within the haunted forest
Lies a plot of gladed stillness,
Secret as a maiden's longing,
Sweet as lovers' vows new-whispered.

* * * *

Woe betide the happy lover
Who with fated foot shall find it!
Woe betide the ill-starred lover
Whose o'erhardy eyes behold it!"

THE large field of penny journalism published in London, has received yet another candidate, under the title of *Farm and Home*, devoted to agriculture in all its branches. Some twelve large pages illustrated, and with a variety of contents, will show the cheapness of the paper; and published at a time when agriculture is an object of interest—and perhaps anxiety—to many, the new venture ought to be a success. We understand the Journal is brought out under the guidance of Mr. Robinson, well known in connection with another agricultural medium.

OUR FOREIGN EXCHANGES.

FROM Denmark has been received a brochure, *En Lokal-Tilvaaxt-oversigt for Bog*, by

Herr Jagtjkr W. Gyltildenfeldt, a reprint from the *Tidsskrift for Skovbrug*. Very great value attaches to every record of the history, natural history, and utilization of bogs and bogland in Denmark. In the *Journal of Forestry*, vol. ii., p. 243, are references to the indications supplied thereby, in regard to the natural rotation of crops in the forests of prehistoric times; and the spirit of the Scandinavian archaeologists imbibed by the student of forest science in Denmark imparts importance to arboricultural operations and observations in arboral growth in that land.

In a former number of the *Journal of Forestry*, was briefly noticed a treatise on Rivers and Irrigations in Spain by Sr. Don Andres Llauro — a work the full value of which I have only lately learned while studying the climatic condition of Spain, and measures adopted for the improvement of this, and finding all the information I desired in regard to points connected with the hydrology of that country there provided to my hand. There has been received from Sr. Llauro a pamphlet entitled *Auxilios del Estado a las Empresas de Riegos, Saneamientos y Mejoramientos Agricolas*.

In a paper which was published in French in the *Annales des Ponts et Chaussees*, and which was subsequently reproduced in German, Bohemian, Italian, Portuguese, and English, and in Russ — the last-mentioned translation having by direction of the Government at St. Petersburg appeared in all the official agricultural journals of the Empire — Sr. L. had shown that extensive irrigation undertakings can only be executed with profit to the promoters and benefit to the general interests of the country when aid is given by the State, and when in addition to the direct returns anticipated by the Treasury there is taken into account the indirect returns brought to it by

the thousand and one fiscal meshes from what may be called sedimentary wealth produced from a thousand transformations of the produce and works connected therewith. And in view of the Government having announced the contemplated inauguration of a legislative company organized for the development of the material interests of the country—and the Minister de Fomento having intimated a welcome proposal to submit soon to the Cortes a draft bill likely to stimulate the execution of extensive works for the utilization in agriculture of water now running to waste, Sr. Llauro has deemed it opportune to bring under the consideration of the Minister in the first instance, and in befitting time under the ordeal of public discussion, some general estimates suggested by his friendly interest in the scheme, and sundry facts and important documents whereby he hoped might be supplied some aid in acquiring a correct knowledge of works already executed in connection with irrigation and sanitary and agricultural improvements—and thus supply evidence of the urgent necessity there is for doing what both the Government and public opinion admit that both the importance and the justice of them require should be done in the matter.

Passing over for convenience sake details of arrangements of a legislative character which had successively been required and made in the country, the author sought to stimulate the spirit of the projected association by giving details of what had been realized in connection with the greater works of canals and works of irrigation in France.

In the *Revista de Montes* is a valuable paper on *Exploitation* and economic properties of *Esparto* Grass by Don José Jordano y Morera.

JOHN C. BROWN.

TREES AND RAINFALL.

WE make the following extracts of an article on "Tree Culture and its Effects on Rainfall," recently published in the *Lumberman's Gazette* (Michigan):—"The rapid denudation of the forest lands of the country," says the writer, "has been the subject of much thought and study, not only on the part of those interested in a pecuniary sense, but has called forth numerous lengthy discussions in regard thereto on the part of literary and scientific men, whose motives may be less sordid than those of the former class. Forest culture to supply the present use and waste of timber has been urged upon the Government (and has received serious consideration on the part of our national legislature), having in view the planting, preservation, and maintenance of forests on the prairies of the west, the principal object of which, of course, is to supply the future demands of that country in regard to lumber.

"But another and very different motive for the consideration of this subject has lately attracted the attention of writers thereon. Not only do forests supply a very necessary want—the supply of the material on which such a vast number of the industries of the country are based—but the influence of forests on the rainfall of a country is receiving at the present time thoughtful and serious consideration. That they do exert such an influence there is no possible room for doubt. Not only is the view sustained theoretically, but the actual practical experience of thoughtful and observing men coincides precisely with the views of scientific men in this connection."

The writer goes on to relate that "several years ago, during a trip through Iowa, Kansas, and Dacotah, having his attention called particularly to this subject by the pioneer settlers, some of whom had so far succeeded pecuniarily that they were enabled

to make practical tests in order, if possible, to demonstrate the correctness of the theory, that tree planting or forest culture, systematically carried out on the prairie lands of the great west, would supply the much-needed and anxiously coveted rainfall, the lack of which was the only obstacle to the immediate pecuniary prosperity of the pioneers of civilization, whose influence on the development of the resources of that country has never yet been properly estimated or recognised. So serious consideration had this subject received at that early period in the history of those territories that very many of the settlers were already carefully watching and noting the results of their tree culture, and its influence, and the invariable testimony was that in proportion to the extent to which it was carried on, the increase in the amount of rainfall kept steady pace. Of course when pressed for an explanation as to the manner of this influence, they were unable to give any very definite ideas, but the fact was there nevertheless, and that was satisfactory to them at least.

"That forests do therefore induce and increase the rainfall to no inconsiderable degree is indisputable, but as to the manner or method by which their influence induces such result it is not quite so comprehensible to ordinary mortals. Experiments prove beyond a peradventure that tree planting is beneficial in more directions than one, but especially in regard to the increase of the humidity of the atmosphere.

"The *Cincinnati Commercial* explains the influence of tree culture on the atmosphere :—

"'Forests influence the atmosphere,' it says, 'more powerfully by their effect on its general humidity than in any other way. An evaporation of moisture from both earth and trees takes place constantly. The evaporation is greater from open soil than from woodland, but the difference is far more than made up by what is called "transpiration" of leaves of the trees. This corresponds in a degree to the insensible perspiration of animals. Some conclusive experiments have been made with growing pot plants, going to show that leaves do not absorb moisture, but that, on the contrary, they give it out. Moisture is absorbed through the roots.

"The quantity of insensible vapour that is given off through leaves is immense, amounting to one and a quarter ounce to the square foot of leaf surface. The world-old metaphor of counting the leaves of the trees has a new significance in the light of science. Pains-taking experiment has enabled those studying the matter to make an approximate estimate of the comparative amounts of vapour given off by earth surface and leaf surface. They have calculated that a square foot of soil sets free about six times as much moisture as a square foot of leaf. The leaf surface is, however, many times greater than the soil surface, so that twice as much evaporation takes place from forest as from open land. When the wood of the country is cut away, therefore, other things being equal, two-thirds of the moisture-giving material of the atmosphere is gone with it. Hence the long fearful droughts on lands bare of trees.'"





TENANT'S EVIDENCE IN THE IRISH LAND COURT.—In a case recently tried before the Land Commissioners at Mitchelstown, Co. Cork, the following amusing evidence was given by a witness for the tenant :—"Patrick Hayes deposed that the farm was the worst in Ireland. When wet, it was too wet; when dry, too dry; and when middling, was worthless. (Laughter.) It produced heath and weeds and furze, and what would kill all the sheep in Ireland. (Renewed Laughter.) It was worth 12s. an acre now, but a tenant should have it for 20 years for nothing before he could make it worth anything. (Great Laughter.)"

MAN KILLED BY THE FALL OF A TREE.—James M'Laren, servant to Mr. Sang, farmer, Kirkton, near Perth, was accidentally killed while uprooting a tree on the farm on Wednesday afternoon. M'Laren had climbed up the tree for the purpose of attaching a rope, when it fell and crushed him below it, and so severe were the injuries he sustained that he died almost immediately. Deceased has left a widow and seven children.

EPPING FOREST.—At a luncheon at the Mansion House, on the 20th ult., at which the Duke of Connaught was present, the Lord Mayor said he had permission to make an announcement which he was sure would be received by the whole metropolis with great enthusiasm. It was that her Majesty had condescended to honour the citizens of London by visiting Epping Forest in the early part of May, and declaring it open, and free for the use of the public, for ever.

THE TEACHING OF FORESTRY.—The College of Agriculture at Downton, near Salisbury, includes this subject in its course of tuition, as will be seen from the following extract from the prospectus :—

"*Forestry.*—The history, propagation treatment, uses, and value of timber trees. Management and valuation of

underwood. The planting, thinning, and general management of Fir plantations. Measurement of standing and felled timber, and of converted timber. Use of sliding-scale, sale of timber and underwood. The economy of wood and forests in the management of estates. The lectures are supplemented by practical classes in the neighbouring woods."—*Gardeners' Chronicle.*

A RAPID GROWTH OF TREES.—At Te Awamutu (New Zealand) a gum tree only ten years old was felled, the height of which was sixty-three feet, while another the same age, was estimated to be at least as high. A *Pinus insignis* at Cambridge, which had been planted just fourteen years, was of such large diameter that it required two men to span the trunk with their arms. In the Waikato district it is not an uncommon thing for pines to attain the height of six to nine feet three years after sowing, while the height of a eucalyptus after the same period ranges from fifteen to twenty feet.—*Land and Water.*

MINIATURE TREES.—The Chinese have a mania, says *Land and Water*, for dwarfing not only their women's feet but also for growing miniature pines and oaks in flower pots. For many years they have kept secret their method of procedure, which has at length been found out. Take a young plant or seedling, when only two or three inches high, cut off its tap root as soon as it has sufficient small roots to live upon, then replant in a shallow earthen pot or pan. Alluvial clay is then put into the pot, in bits about the size of the beans, only just enough to nourish the plant very scantily. The miniature trees are scantily supplied with light and warmth, and pegged and wired down in order to produce fantastic shapes; the gardener prunes and sears the roots with hot irons, and the poor little starveling gives up all attempt at growing; each fresh set of leaves becomes smaller and smaller, the buds and rootlets are equally

dwarfed, and in a period ranging from ten to fifteen years the miniature tree has arrived at perfection.

THE FORESTS OF THE SUTLEJ VALLEY.—Dr. Brandis has published *Suggestions regarding the Management of the Leased Forests of the Bussahir in the Sutlej Valley of the Punjab*. Deodar is at present the only tree that can be exported from these forests on a large scale, but walnut and boxwood are available, and the latter especially should be looked after in view of the scarcity and large demand for this wood. *Pinus excelsa*, or blue pine, is also of some commercial importance, and there are forests of limited extent of *Pinus longifolia*.—*Gardener's Chronicle*.

CARLYLE ON TREE PLANTING IN IRELAND.—The following was addressed to the *Nation* of December 1, 1849, by Mr. Carlyle, at the close of a tour in Ireland:—"Many Irishmen talk of dying for Ireland; but before dying for your country think, my friends, in how many quiet, strenuous ways you might beneficially live for it. Every patriotic Irishman (that is, by hypothesis almost every Irishman now alive) who would so fain make the old country a present of his whole life and self, why does he not, for example, directly after reading this, and choosing a feasible spot, at least plant one tree? That were a small act of self-devotion; small but feasible. Eight million trees before the present generation run out, that were an indubitable acquisition for Ireland, for it is one of the barest, ruggedest countries now known; far too rugged a country, with patches of beautiful park and fine cultivation, like shreds of bright scarlet on a beggar's clouted coat—a country that stands decidedly in need of shelter, shade, and ornamental fringing, look at its landscape where you will. . . . Eight million trees—and I rather conjecture eight times eight million would be very welcome in that part of the empire. . . . 'Trees of liberty' have not succeeded well in these ages. Plant your eight million trees of shade, shelter, ornament, fruit; that is a symbol much more likely to be prophetic. Each man's tree of industry will be, of a surety, his tree of liberty; and the sum of them, never doubt it, will be Ireland's."—*Pall Mall Gazette*.

A RAILWAY IN THE TREE TOPS.—It may not be known outside of the

neighbourhood where it is situated, says a Californian paper, that in Sonoma County (Cal.) we have an original and successful piece of railroad engineering and building. In the upper part of this county, near the coast, may be seen an actual roadbed in the tree tops. Between the Clipper Mills and Stewart's Point, where the road crosses a deep ravine, the trees are sawed off on a level, and the timber and trees laid on the stumps. In the centre of the ravine two huge Redwood trees standing side by side form a substantial support, and they are cut off 75 ft. above the ground, and cars loaded with heavy saw logs pass over them with as much security as if it were framed in the most scientific manner.

ARCTIC CONIFERÆ.—The following are the pines which Baron Nordenskjöld found to the extreme north of the Russian possessions: *Larix sibirica*, *Pinus Cembra*, *Pinus sibirica*, sometimes known as *P. pichta*, *Pinus sylvestris*, a Scotch pine, and *Picea obovata*, which is the same or nearly the same as that grown in our nurseries as Oriental Spruce.—*Garden*.

CRATÆGUS ARBORESCENS.—Dr. Engelmann, says the *Garden*, states that this is the largest North American Hawthorn. It grows on the alluvial river bottoms below St. Louis. It makes a trunk 28 in. in diameter. The red or orange coloured fruit persists all winter, long after all other kinds of Haws have fallen.

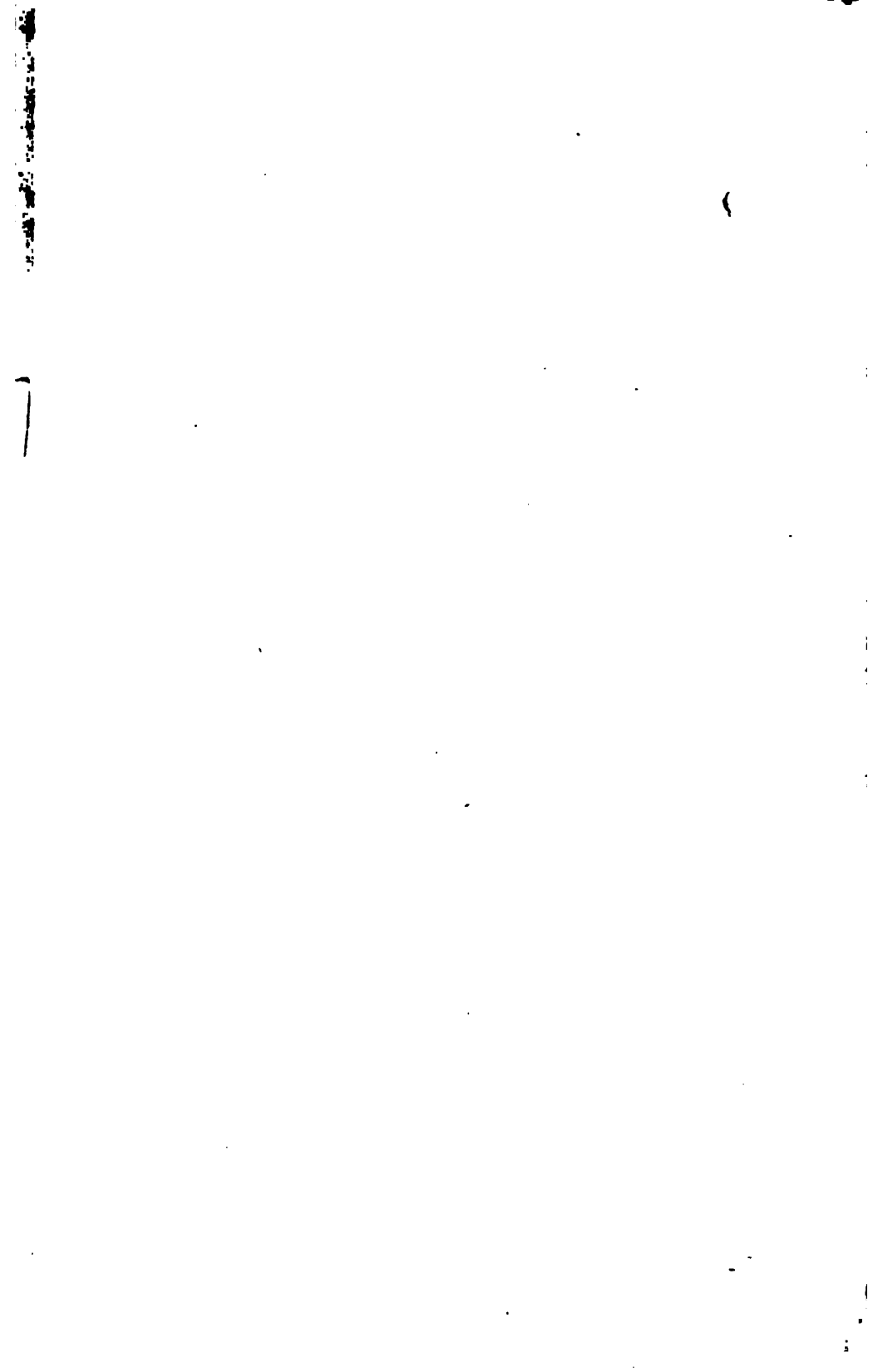
PRESENTATION.—Mr. John Lee, long connected with the Royal Vineyard Nursery, Hammersmith, was entertained at a Complimentary Dinner recently, and was presented by one of the Vice-Presidents of the Gardeners' Royal Benevolent Institution, with a service of plate, of the value of fifty guineas, subscribed for by the office-bearers of the Institution, to mark their sense of the valuable services he has rendered to the Institution during the long period of forty-one years, as a trustee of the Institution.

HARTLEPOOL.—A premium of £30 is offered by the West Hartlepool Improvement Commissioners for the most approved plan for laying out the new "Ward Jackson Park," 17 acres in extent.



3 2044 102 799 897







3 2044 102 799 897

